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Godfrey Dawson
Steve Brown
Clive Dixon
Garry Johnson

N·E·W·S



Autumn Gold

U.S. Gold have announced no less than nine major Spectrum releases for this autumn. First there was the Mattel Toy range, then the film, the TV cartoon and now the computer game as US Gold have snapped up the rights to He-Man and the Masters of the Universe. The spin off has spawned not one but two games, He-Man and the Masters of the Universe (Arcade version) will be out in October and the adventure is set for November release. Just in case you've missed then on TV He-Man, Battle Cat, Teela Man-at-Arms and Orko are locked in conflict with the evil Skeletor for the dominance of the land of Eternia.

Vortex Software have just signed an agreement with US Gold who will be manufacturing, prompting and marketing future Vortex products. The first game to appear under the new arrangement is Revolutions available in September, in which a rolling ball is controlled in various ways by the player to solve puzzles and avoid flying objects

Another offshoot of the US Gold/Vortex deal is that the recent Vortex release Alien Highway will be re-released on the budget American label of £2.99.

Infiltrator arrives on the Spectrum in September. Written by Chris Gray of Boulderdash fame, Infiltrator has already been a success in America and combines flight simulation, adventure, arcade and strategy elements. Infiltrator as the name suggests is an espionage whereby you must find your way by fair means or (preferably) foul into the enemy headquarters of the Mad Leaders Guard. It all begins with a helecopter flight simulation into enemy territory followed by a nervewracking entry into the Mad Leaders compound where every guard wants to see your papers. The objective is to find and photograph the evil enemies blueprints for total victory.

US Gold has two Epyx inspired products lined up, Supercycle, a motorcycle race simulation and World Games another variation on the Winter and Summer Games formula.

This time a traditionaol sport from eight countries has been selected so that you can be transported from perilous cliff diving in Acapulco to the Sumo wrestling in Japan.

The other four US Gold releases are all conversions of coin-op games. Xevious is an all out shoot-em-up schrolling over seemingly endless landscape and blasting hosts of flying adversaries before you can get a crack at the giant ship Andor Genesis.

Express Raider is a karate cowboy game where all the action centres around a moving train in the old West. In the first phase you must fight your way onto the train and along the top of the carriages to gain control of the locomotive. The second phase is a shooting gallery variation with you riding alongside the train on horseback taking potshots at the passengers who are firing at you from every available window. Just like British Rail really.

Breakthru is a game which Tim Chaney of US Gold describes as being "complete and utter mindless violence featuring a jeep that can jump." The mission is to bring back a secret fighter plain that has been stolen and hidden in enemy territory.

Gauntlet, one of the most successful arcade games ever will be available for the Spectrum in early November. The Spectrum game is promised to contain the full arcade Gauntlet map and is a two player game but the difference being that it takes too players to try and blast their way through the maze packed with monsters.

There are four characters to choose from who each possess different strengths, Thyra the Valkerie has formidable armour, Thor the warrior is skilled at hand to hand combat, Merlin the magician can summon up spells at will and Questor the elf has a quick turn of speed. Success in the game depends a lot on stamina as there are hundreds of rooms to clear and it is just a question of how long you can survive.

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Going Boldly. . .

To celebrate the 20th anniversary of the Star Trek television series Beyond have announced that they've scooped the rights to make the first official Star Trek game.

There have been several (unofficial) games based on ST before, though they've generally been adventures or strategy games. But Beyond's game will be more of an arcade/strategy game, and is to be produced by an all-star programming team headed by Mike 'Lords of Midnight' Singleton. The game should be ready for release in late September to coincide with yet another series of ST repeats on the BBC (though Star Trek IV should be in the cinemas this Christmas and will probably generate a lot more publicity).

Beyond's Mark Pierson claims that the game will be "a most significant step in the evolution of the computer game," but I think it's more significant that I got to the end of this news item without making any jokes about Spocktrums, beam-me-up-Scotty, or William Shatner's wig.

Spock and Kirk heroically contemplate the prospect of being turned into Spectrum Sprites. Kirk's okay, but will Spock have attribute problems?

Durell's Big Four

Lots of companies are preparing their autumn launch plans at the moment, and that includes Durell Software. They'll be following up their Saboteur hit with, you've guessed it, Saboteur 2, in November. But before then they'll be coming up with The Big 4 — a modestly entitled compilation of four earlier Durell games, Saboteur, Turbo Esprit, Combat Lynx and Critical Mass, all bundled together for £11.95 and due for an October release.

September will see two new games, Thanatos and Chain Reaction, putting you in control of the dragon Thanatos, and attempting to stop a Soviet nuclear reactor from blowing up. . .

Floppy Aid

It's possibly not as relevant to Sinclair owners as to owners of other micros, but it's still worth mentioning FLOPPY AID here. Floppy Aid is a project aimed at raising money, through sales of floppy disks, to be donated to Bob Geldof's Band Aid Trust. The project has brought together some of the biggest names in the magnetic media industry, including Epson, Memorex, Mitsubishi and Barclays Bank (eh?).

Most Sinclair users are still stuck in the good old days of tape based software, but if there are any of you out there with disk drives and you'd like any further information about Floppy Aid, then you can contact Mark Harris on 0734-483383 or David Anderson on 03722-74182.

Spectrum Games Top Ten

1	( )	Jack the Nipper	Gremlin
2	( )	Ghosts and Goblins	Elite
3	(3)	Pyracurse	Hewson
4	(4)	Green Beret	Imagine
5	( )	Hunchback — The Adventure	Ocean
6	( )	Toadrunner	Ariolasoft
7	( )	Cauldron 2	Palace
8	(9)	The Price of Magic	Level 9
9	( )	Bobby Bearing	The Edge
10	(10)	Way of the Tiger	Gremlin

Last months chart topper World Cup Carnival has vanished after just a month in the chart proving perhaps that there is always room for topical opportunism in the Spectrum Chart, even if it is short-lived. Biggles, the former No 2 has also disappeared into the sunset without trace. There are only four survivors from last month showing the volatile nature of the Spectrum software market. Longest stayers are Way of the Tiger, No 1 in May and Green Beret which entered at No 1 in June and is still holding steady at No 4.

Cheetah Mach 1

Cheetah are currently working in what they're calling "the ultimate joystick for the home computer market," priced at just £14.95.

The Mach 1 is designed for long life, reliability, and ease of use. It will have four fire buttons, two in the handle and two on the base, to ensure that it can be used by either right or left-handed players (about time too), and is constructed out of high-impact materials to survive long bouts of alien zapping. Cheetah were just putting the finishing touches to the stick as we went to press, so it should be in the shops quite soon and we should have a review ready for next issue.

Specdrum Winners



For five Spectrum owners their computers will never be the same when they receive their Specdrum prizes. They can now convert it into a professional standard drum machine.

The lucky five are Mr J. Day, Bicester; Simon Lewis, Stoke on Trent; Michael Bradley, London SW1; Bruce Allman, Hyde, Cheshire and Richard Morley, Hitchen.

Twenty runners-up can console themselves by blasting a few aliens with the Cheetah 125 Joystick. They are Jonathon Thomson, Purley; R. K. Sims, Snodland; Paul Dennet, Fleetwood; J. Husband; Stockton; Martin Harvey, Croydon; A. Streeter, Brighton; Neil Taylor, Langley Mill; Timothy Hoodless, Bedford; Charles Barron, Ellon, Aberdeenshire; Michael Payne, Stroud; Peter Merril, Wheatley; M. Lantair, Bedminster; Paul Southby, Windsor; Kevin Scott, Hawick; P. Flint, Wellingborough; K. Evans, Macclesfield; Giles Cartmell, Derby; Christopher George, London SE15; A. Hawcroft, Manchester; Peter Jarvie, Lanark.

Fist II

Melbourne House's megahit, Way of the Exploding Fist, has spawned a sequel.

Fist II: The Legend Continues combines the arcade action of the original with a strategic element. Taking your warrior through a landscape of swamps and dark forests, you have to take on an assortment of Ninjas, Shoguns, wild animals and various other warriors. But you also have to locate a number of hidden scrolls which will pass on secret battle skills and help improve your fighting abilities so that you can eventually take on the evil warlord who rules the land from his volcano fortress.

The Commordore version of Fist II is due out this month and the Spectrum version should follow on soon after that.



"Ocean will get the Highlander game out on time, won't they?"

Highland games

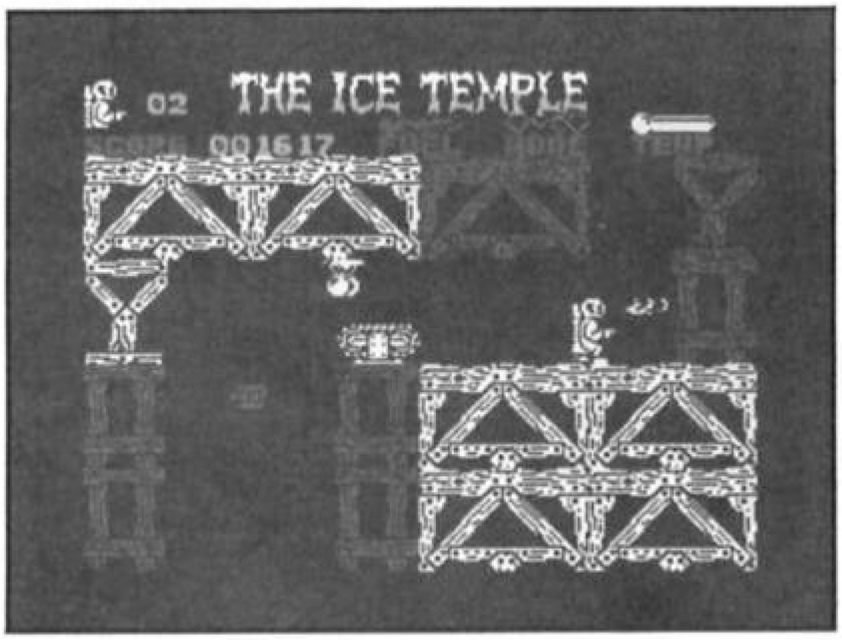
Ocean have tied up another major licensing deal for the rights to a game based on the new film Highlander. This is an epic fantasy adventure film starring Sean Connery and Christopher Lambert which is due to open in London on the 29th August.

Ocean weren't saying much about the game, mainly because they didn't realise that our mole in the film industry had told anyone about the game, but the film is about a group of immortal warriors who battle down the centuries to capture The Prize. The hero is a scottish chap called Connor MacLeod and his main enemy is a nasty piece of work called The Kurgan who goes around killing people, scaring nuns and kidnapping the hero's girlfriend so it's a fair bet that the game's plot will revolve around that.

Ocean did just say that the game will cost £7.95 and 'should' be out in September to coincide with the film's release.

Bubbling under

Bubble Bus haven't produced anything for the Speccy for a little while, but this autumn should see to new releases from them. Ice Temple and Moonlight Madness sound like arcade-adventures in the style of their last hit, Starquake. In Ice Temple you have to hunt through the temple looking for your stolen space cruiser, whilst in Moonlight Madness you've got to crack the combination of a safe containing desperately needed medicine. Both games should be available this autumn, priced £7.95.



'Owzat!

Audiogenic are planning to produce an upgraded version of their Graham Gooch cricket game. The new version of the game will include new squads for the English and Australian teams and batting averages adjusted to take into account their recent form. However no changes have been made to the "superbly lifelike animated graphics," nor, it seems to any other major features of the game. So if you want to see England getting hammered again Audiogenic make it possible for £9.99.

Spot the shot

From the end of July onwards, Ariolasoft are running their Great Screen Shot Challenge. Each new Ariolasoft game will contain a Screen Shot Challenge card, with a screen shot taken from one of their games on it. All you have to do is guess which game the screen shot is from and you could win a free game, Ariolasoft badge or some money-off.

And whether you get it right or wrong you can still enter their big prize draw, to take place later in the year, in which you could win a Spectrum 128 or a Commodore, Atari or Amstrad machine.



Something fishy

Well, that's the only headline I could think of about a new software label called Piranha. Set up by Macmillan Publishing, who have already dipped into the software market in a small way with games like World Cup, Piranha will be kicking off with five new titles with lots of character licensing deals involved.

Trap Door is an intersting sounding graphic adventure that will also include 'giant animated characters', and is based on a new television series from Terry Wogan Productions (well, he's turned up everywhere else, so he might as well have a computer game too).

Nosferatu, based on the horror film, will be a three-dimensional graphic adventure, and another adventure will be The Colour of Magic, based on a well known (?) comedy science fiction novel.

Piranha will also be leaping into action with a couple of arcade blasters based on the 2000 AD comic strip, Rogue Trooper and another set of characters called Strike Force Cobra.

Comms down

Tandata's QL Communications equipment has been drastically cut in price. The entire package can now be bought for just £79.95, and consists of three modules that can also be bought separately. Q-Connect, the two-way RS232 interface with software can now be picked up for just £49.99 on its own, the Q-Mod modem for £59.99, and the Q-Call unit.



Tantalus Winners

Ten intrepid winners can tackle their prize Tantalus game armed with the additional goodie of a Speed King joystick.

The ten are, David Nunes, Ohio, USA; C. Smith, Barton; R. Davidson; Addlestone; Bruce Whitehorn, Fleet; C. Stanford, Northallerton; Paul Robinson, Maryland USA; Ross Holloway, Limpsfield; M. Musgrove, Bracknell; Martin Sharpe, South Harrow; Kenneth Dryburgh, Kircaldy.



Gargoyle go Faster Than Light

Faster Than Light is the new arcade label from Gargyle Games which will be launched at September's PCW Show.

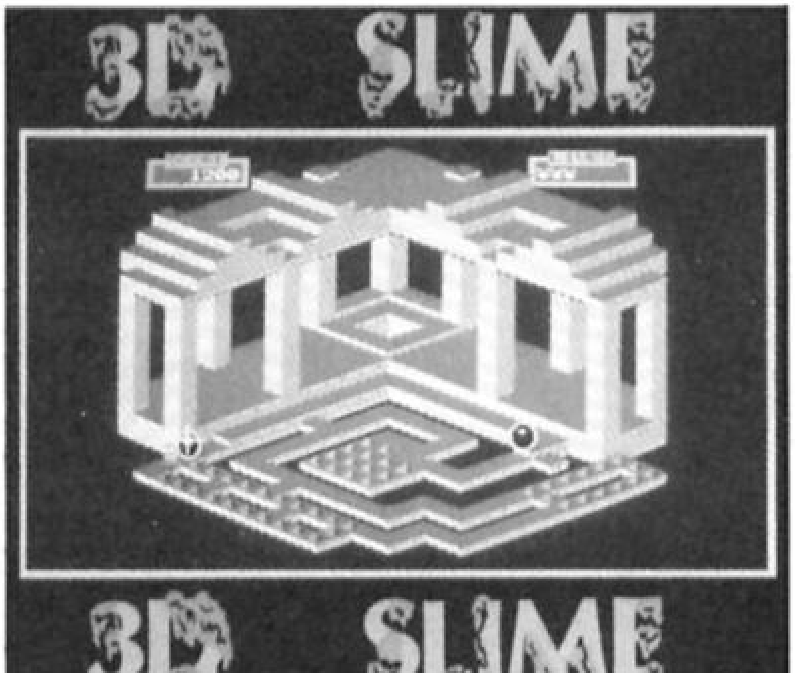
Gargoyle have built themselves an impressive reputation for quality and originality in the field of adventure games, and it looks as if their move into the arcade market is going to maintain that reputation with the development of a technique called 'Lasermation'. Ted Heathcote, one of Gargoyle's directors, told us that Lasermation is "a new technique for showing really vivid high speed animation. It's another one of Greg's (Greg Follis) imaginative ideas."

The first two Lasermation titles, Light Force and Shockway Rider should be on show at PCW and are due for release in late September and mid-October respectively. And there's a third title, Samurai Dawn due for later in the year.

3-D Slime Winners

Five winners of our QL software competition will carry off both 3-D Slime and the graphics utility CADPAK from Datalink Systems.

They are, Grahem Warne, Plymough; R. Sands, Skipton; J. Vanags, Mansfield; Calvin Renders, Farnham, Surrey and Graeme Copping from Ilkeley.



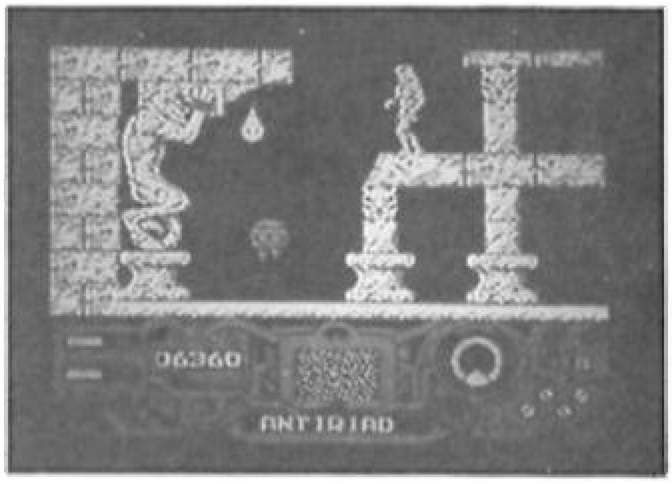
Revised Realms

Alan Davis, author of Realms of Interaction would like to include some amendments to this months feature.

"In the assembler program lines 560 and 570 are in the wrong order,a nd so are lines 670 and 680. Much of the time this has no effect but occasionally gives rise to inexplicable appearances or disappearances of characters. It can be corrected by the following pokes!"

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POKE 65111,43 : POKE 65112,202 : POKE 65113, 119 : POKE 65114, 254
POKE 65129,43 : POKE 65130, 202 : POKE 65131, 119 : POKE 65132,254
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THE SACRED ARMOUR OF ANTIRIAD



ZX takes an early look at a soon to be released game from Palace Software.

"That's the forest. The natives live in the forest," said Steve, pointing at the pencil sketch map in front of us.

"No they don't," said Dan. Dan Malone is the game's designer so he gets to win that argument. It turns out that the forest is full of "nasties" and all the natives live outside the forest, but it's in the forest that the hero, Tal, begins his quest for the Sacred Armour of Antiriad in the next game from Palace Software, due for release in late September/October.

Like many of the people working at Palace, Dan is an artist rather than a programmer and he concentrates on designing games — ideas and graphics — rather than the nuts and bolts of writing the computer program. He first got the idea for Antiriad in February this year, and then worked on the game design for a few months before starting work with the programmers who would help to put together the completed game.

Antiriad is set in the distant future, after a nuclear war has wiped out our civilisation and a new race — hardy but primitive — has taken over. They live in peace until a race of aliens invade the earth and enslave the natives, using them as slave labour to mine the earth's core.

The aliens install themselves in the heart of an ancient volcano, taking over the remnants of an old pre-war city built at the foot of the volcano and surrounded by the forest that you've already heard about. And right at the centre of the volcano is the aliens' generator, heavily defended and highly radioactive, which is the source of their power and without it they are vulnerable.

In secrecy a small group of free humans have been rearing their children as warriors, and one day their champion, Tal, is chosen to penetrate the alien complex and destroy the power centre. Not an easy task for an unarmed barbarian, but the legends of Tal's people tell of the sacred armour and its magic powers which could enable Tal to complete his task. The armour, an AntiRadiation combat suit left over from before the nuclear war, is hidden in the forest along with a number of other items that are needed to power and equip it.

Your task is to take the part of Tal and to venture into the forest to seek out the armour and then reach the aliens' power centre. But there are many dangers lying in wait for you. The forest is inhabited by many deadly creaturs, including mutated wildlife and humans who have collaborated with the aliens, having weapons grafted onto their bodies. Then there are the alien 'droids: Hunter 'droids that can home in on you and follow you all over the city, and Alarm 'droids which send out signals informing all the other 'droids and aliens of your position.

The city is also defended by these 'droids, not to mention the acid rain that falls from above and the traps that I'm not going to tell you about. And the closer you get to the power centre, the higher and deadlier the radiation level becomes, resulting in fried Tal if you're not careful and quick. The generator itself is heavily defended, and getting through the last rooms, is a task in itself. "We wanted to make it as spectacular as possible," Dan told me.

The Spectrum version of Antiriad was still about a month from completion when I saw it, but what was there looked pretty good. In fact, just for once the Spectrum's graphics look like they can match the opposition. I also saw the Commodore version of the game and it actually looked a bit less colourful.

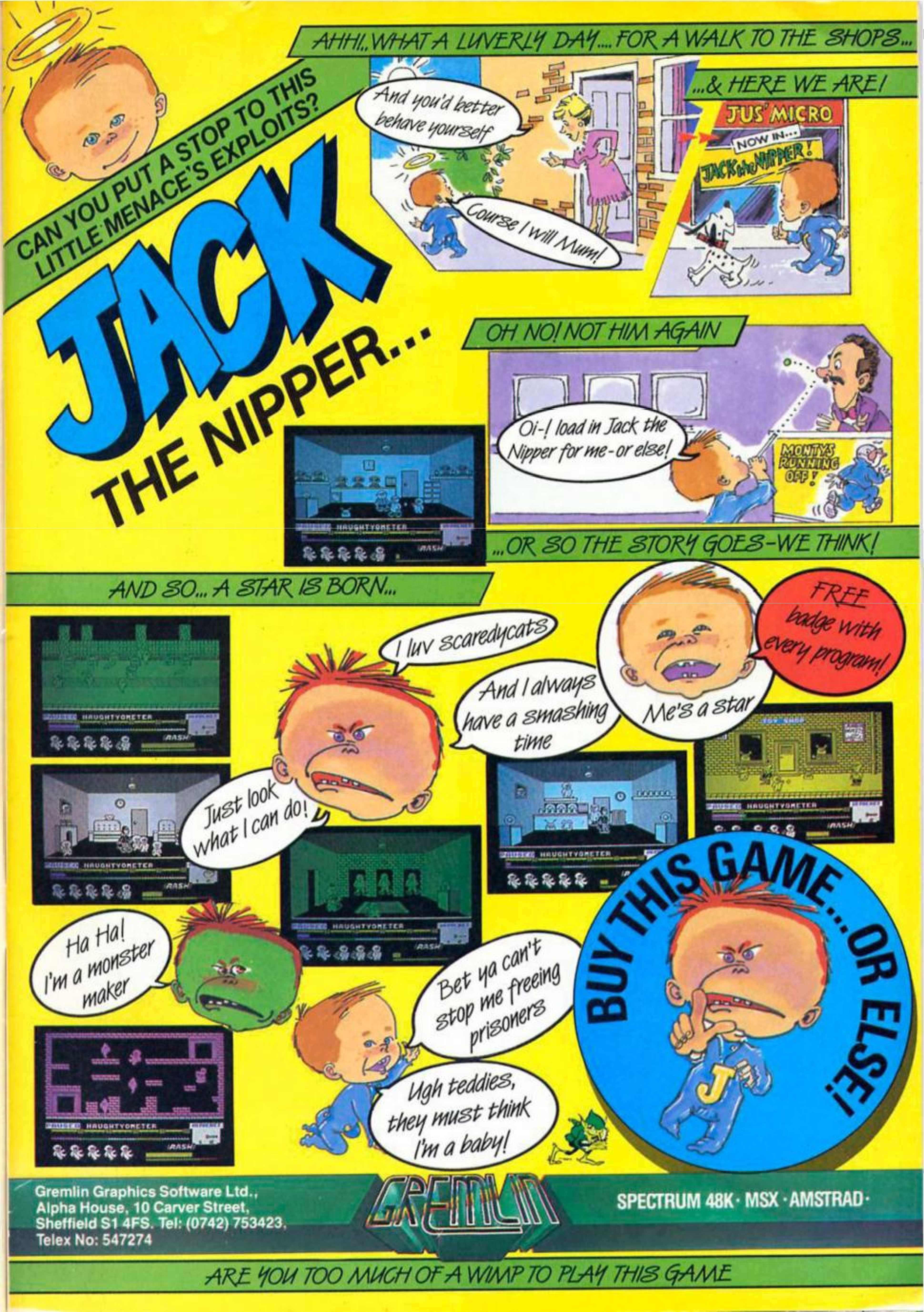
"It's swings and roundabouts," said Steve Brown, another of Palace's artist/designers. "You get more detail on the Spectrum, but less colour."

With so many artists working there, Palace seem to specialise in graphically stylish games and judging by what I've seen so far Antiriad looks set to continue that trend. What's more, Palace have even brought their graphic flair to the boring business of wading through cassette inlays. All the plot details that I outlined before are explained in a small comic book that Dan has written and drawn, and which will be included in the finished package.

It's an original idea and the comic is very professionally produced, and if it's any indication of the quality of the finished game then keep a look out for Antiriad in the shops in *about a month's time.*



A gentle, delicate moment from the Antiriad comic book.



CAN YOU PUT A STOP TO THIS LITTLE MENACE'S EXPLOITS?
JACK THE NIPPER...
AHH!..WHAT A LUVERLY DAY.... FOR A WALK TO THE SHOPS...
And you'd better behave yourself
Course I will Mum!
...& HERE WE ARE!
JUS' MICRO
NOW IN...
JACK the NIPPER!
OH NO! NOT HIM AGAIN
Oi-! load in Jack the Nipper for me - or else!
MONTYS RUNNING OFF!
...OR SO THE STORY GOES-WE THINK!
AND SO... A STAR IS BORN...
I luv scaredycats
And I always have a smashing time
Me's a star
FREE badge with every program!
Just look what I can do!
Ha Ha! I'm a monster maker
Bet ya can't stop me freeing prisoners
Ugh teddies, they must think I'm a baby!
BUY THIS GAME...OR ELSE!
Gremlin Graphics Software Ltd., Alpha House, 10 Carver Street, Sheffield S1 4FS. Tel: (0742) 753423, Telex No: 547274
GREMLIN
SPECTRUM 48K · MSX · AMSTRAD ·
ARE YOU TOO MUCH OF A WIMP TO PLAY THIS GAME

THE MONSTER RATINGS

Introducing the Globs — a family of dedicated software reviewers who will be working day and night to bring you the lowdown on the latest games. Each month software is airlifted to the family seat, Globule Towers, where it is rigorously tested for entertainment value playability and value for money.



The ZX Monster Hit
The ultimate accolade, a surefire hit that's essential for your games collection.



Globella
A special game with addictive features. Miss it and miss out.



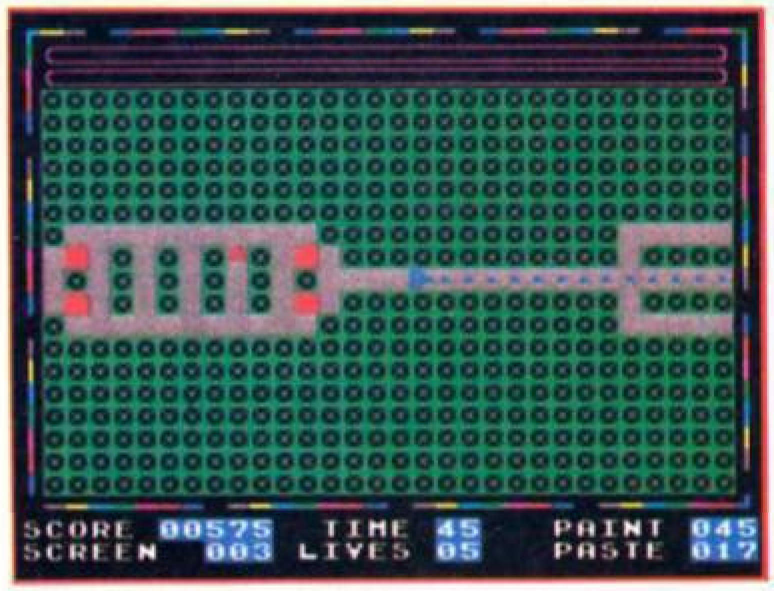
Globert
An average game with limited appeal.



Glob Minor
Snooze software — strictly for insomniacs.



Glob Senior
An exasperating game well below the accepted standard.



DEKORATING BLUES

Alpha-Omega
£1.99

This is a simple but effective game which is similar to the programs often published in magazines. It is, however, much faster and bigger than could be achieved using BASIC.

It is a type of maze/chase game, rather like Pacman in reverse. For each of the many screens you have to fill in the passageways with dots which represent painted areas while avoiding spray cans and beasties until you have used up the amount of paint allocated to each floor.

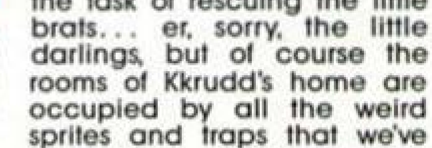
Each of these screens has been carefully designed in the shape of an object, ie. a hammer, castle etc. and part of the fun is getting to see what shape the next maze will be!

There is a nice selection of well designed and animated sprites to make your task that much harder and some will remove dots which you painted in earlier. This can be an advantage, but collision with any will result in your demise. Should you find a fast moving sprite catching up to you, you can drop a dollop of paste which will stop it for a short period of time. You only have a limited number of these dollops and that, plus your lives, score and remaining units of paint is displayed at the bottom of the screen.

The screen is nicely presented and is clear and easy to understand, though I found it strange that painted areas are represented by dots rather than a colour area.

What is there to say of a game such as this? It is simple in concept yet enjoyable to play, the element of challenge is enough to keep you trying for a high enough score to get a higher position in the hall of fame. The level is set so that I got into the lowest position at the second attempt.

A good solid program.



KIDNAP

Creative Sparks
£1.99

After a fairly quiet period, Creative Sparks budget range is trundling back into action with a few new titles. Kidnap, one of the first new releases, came as something of a surprise when I loaded it up. It's a platform game (remember those?), and while just a few months ago I might have snorted in derision and chucked it onto the heap of Jet Set Willy clones in the corner, the novelty of playing a simple ladders 'n platforms game after all the megacomplicated arcade/strategy/adventure epics of recent months made a pleasant change.

As with all platform games the 'plot' is pretty meaningless. Kidnap concerns an alien being called Kkrudd who goes around kidnapping babies and keeping them frozen in suspended animation in his home in outer space.

Kkrudd has captured thirty-two little nippers and these are hidden away in the thirty-two rooms of his home. You, as the only available Space Agent in the area have been assigned the task of rescuing the little brats... er, sorry, the little darlings, but of course the rooms of Kkrudd's home are occupied by all the weird sprites and traps that we've come to know and love from earlier platform games.

Kidnap isn't the hardest platform game that I've ever played, and in most of the rooms it only took a few moments to work out how to reach the babies. But one nice touch is that in some rooms the baby can only be reached by going off screen and coming back on via an alternative route which isn't always easily found. The graphics are quite simple, though they are perfectly adequate for this type of game, and animation and use of colour are all quite good.

I suppose that platform games are ideal for budget software as the format and programming techniques are all well established by now. My

GAMES

SUBTERRANEAN NIGHTMARE
Americana
£2.99



A game which could easily be subtitled "Manic Miner Rides Again". This is probably the closest clone that I have seen in both screen format, character size and animation and sense of humour. The only thing missing is the perpetual tune that played throughout the original.

Anyway, the plot for this game is that in 1991 underground disturbances are detected in the area of the Nevada Desert where the 1986 Nuclear Test took place. You, in the guise of Prof Fusion, have arrived to find out what is happening. By accident you fall into the underground caverns where you are beset by various mutant beings. To escape you must collect the Radium Crystals and find the way out. Collecting a crystal may open a further door to provide you with more alternative exits.

Although the central character is a small sprite, the screens contain beasties of varying size and detail, all very well designed indeed. A novel feature is that should you jump on the head of some of the mutants you may be able to make a further jump and gain access to higher areas of the screen.

Sound is used for effect, various blips and bleeps accompany your efforts and the whole thing appears to consist of quite a few locations.

OK, so it is a MM clone, but it is done in the same tradition and is a worthwhile addition to your collection if you are a fan of such programs, especially at the asking price. As in the original, part of the challenge is in discovering new rooms, one of my favourites was the Fission Chips room! (you see what I mean about the humour)

Recommended to addicts everywhere.



PUD PUD
Americana
£2.99

Subtitled "In Weird World" this game features a sharp toothed Pacbeing with little feet and wings instead of ears.

The rather spotty Pud Pud family seem to have Praying Mantis blood in them somewhere as Mrs PP's kiss is deadly to Mr PP (who you control). However Mr PP tolerates the risk because he loves her "delicious puddings" — Leave the room all those with dirty minds!

Your task is to find and eat ten puddings, which look rather like a bowl of Cornflakes, find the secret exit and escape. To achieve this you will have to discover which of the brightly coloured sprites are edible. Eating one will increase your energy which is falling at a frightening rate, but eating one of the wrong type will take a further chunk of your energy.

A thoughtful set of control options cover most joysticks and also two sets of keyboard controls for the L/R/FLY. Good news for left handed gamesters!

I don't know what it is about this game that fails to excite me, it's bright, well animated, well conceived and designed, simple to grasp and has a nicely judged element of challenge. Perhaps it's just that it doesn't appear to have that spark of originality. I get the impression that, in other guises, I've seen it all before and it all seems rather dated.

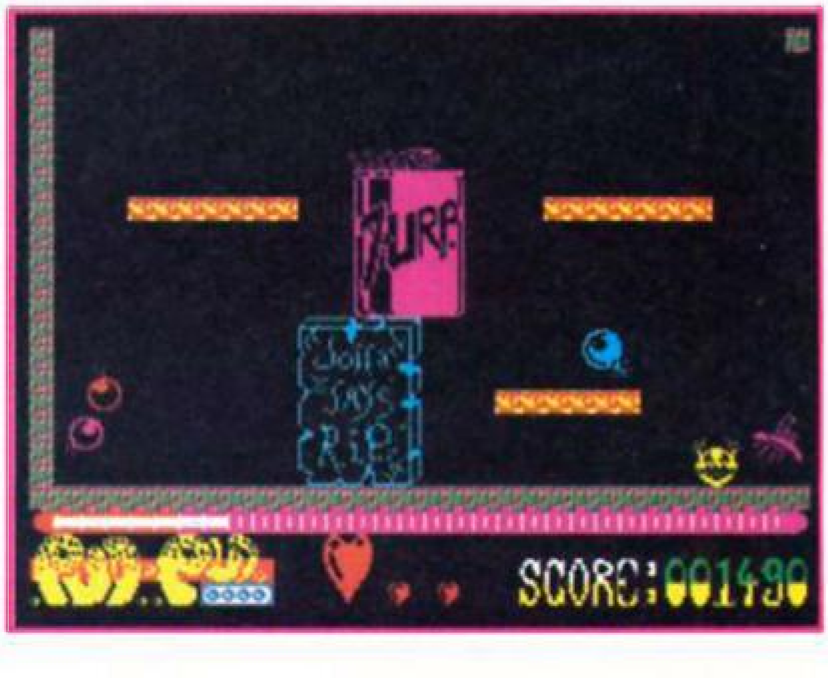
In all fairness relative newcomers may well find that this is a great buy and enjoy playing it. Old hands will probably find it a bit of a yawn.





only real doubts about this game are that it's not as challenging as it could be and that 32 rooms isn't a lot when you think that other games in this style have more than 100 rooms each. Still, for £1.99 it's reasonable value and should divert you for an hour or so.





SUMMER SANTA

Alpha-Omega
£1.99

I'm not sure whether this program was too late for last Christmas or too early for next! There seems precious little reason else why the "summer" has been added to the title, apart from it being that time of the year.

This is yet another platform, jump and dodge game, but it has one or two interesting ideas. The plot is that you, being Santa, have to deliver the presents to a sleeping household — either rather late or early — and drink the glasses of sherry which have been thoughtfully left out for you.

There are problems to solve, levers and trapdoors to open and jumps which have to be timed carefully to succeed. The character you control and the sprites are large, reasonably well animated graphics, rather like those used in the "Wally" games. The screens are attractive, colourful and fairly realistic.

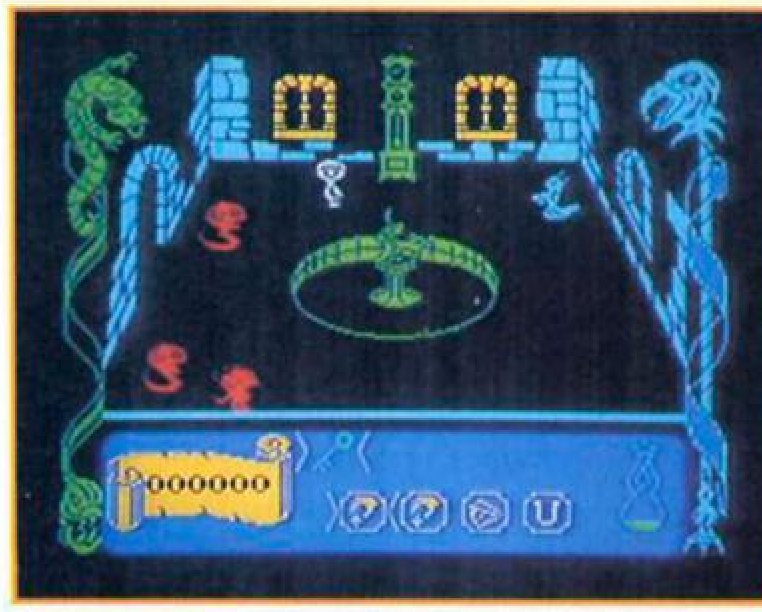
Where this program suffers is in the usual manner of attribute colour clashes, and the main character tends to flicker slightly. Some of the positions from which a jump may be made are a little strange and not very obvious. This tends to be somewhat confusing!

Having said that, there is a DEMO option which will show you how to complete some 44% of the game. This provides you with many answers and some clues for the screens not yet explored. The house is not particularly large and experts in this type of game might find it a bit too easy to complete.

Not a bad game, just a bit ordinary, however this could be a good game for newcomers or those who cannot cope with the deviousness of the more complicated games of this genre.







CON-QUEST

MAD Games
£2.99

You discover that your newly bought castle is teeming with Demon Grell and his terrible minions. As Oscar, you must evict them all in this arcade-adventure hybrid.

The screen presentation is a curious *mixture of 3D for the* rooms but 2D for the moving characters. Both the creatures and Oscar are adequately drawn and animated, but dull by today's standards, and a bit flickery too. When simply moving around avoiding the minions (which is a little too difficult), the game strongly resembles Atic Atac. The new twist is the addition of oh-so-trendy icons. By swinging a pointer you can select TAKE, DROP, EXAMINE or USE; then using another pointer you can select which object carried you want to act on. Appropriate, short text messages appear on examination and sometimes after other actions.

The trouble with this system is that you have to move the pointers whilst in the midst of the action and often under attack, so things become very frantic. Spellbound had a much more effective system.

The problems you face seem fairly simple: find the right coloured key for the correct door or chest (sorry — *black and white TV owners cannot* plays this one), read a book then use a wand to shoot the nasties (when the fun starts) and so on. Mapping is vital and initially confusing as Oscar starts in a number of different locations.

This is a passable game, but better suited to Mastertronic's two pound range, and a disappointment from programmer Derek Brewster who's written better.



MERMAID MADNESS

Electric Dreams
£9.99

Myrtle is a 112 year old, and somewhat buxom, mermaid who has taken a fancy to Gormless Gordon the scuba diver. But Myrtle's affections are not reciprocated by Gordon, and to get away from the watery wench he hurls himself into the briney only to become trapped in the undersea wreckage of a sunken ocean liner.

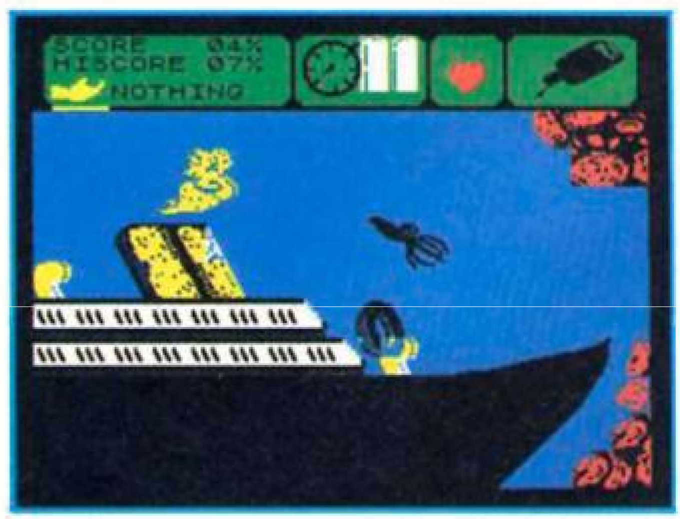
This is your big chance. Taking the role of Myrtle, your task is to explore the underwater caves and, collecting the objects that you'll need to solve various problems, locate Gordon and rescue him before his air-supply runs out.

Controlling Myrtle is simple — she can swim left/right and downwards, or, if none of these controls are being used, she will start to float upwards. At the top of the screen is a beating heart which tells you how close she is to Gordon; the faster it beats the nearer he is. But it may sometimes be necessary to swim away from him in order to locate some important object.

Swimming the salty seas alongside Myrtle are all sorts of fish, who, if they collide with her, will drain her energy level. In some ways this is similar to the old Scuba Dive game from Durrel, as you have to guide your figure through the underwater landscape collecting objects and avoiding the predatory sea creatures, although the problem-solving aspects of this game add an extra element to the format.

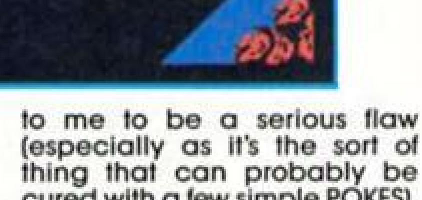
Myrtle's energy level is indicated by a bottle of beer, and as this empties her energy gets lower until an empty bottle signifies the loss of her life. The trouble with this is that the beer bottle can empty very quickly (especially as you can sometimes collide with a fish as soon as you enter a new screen, and before you've had a chance to doge out of the way) and when this happens you don't just lose a life and then start with another.

You only get the one life, and if you lose that then it's the end of the game. You can find other bottles underwater which top up your beer supply just a bit, but I still found it ridiculously easy to lose that single life and I've lost track of how many games I've played that were over and done with in a matter of seconds.



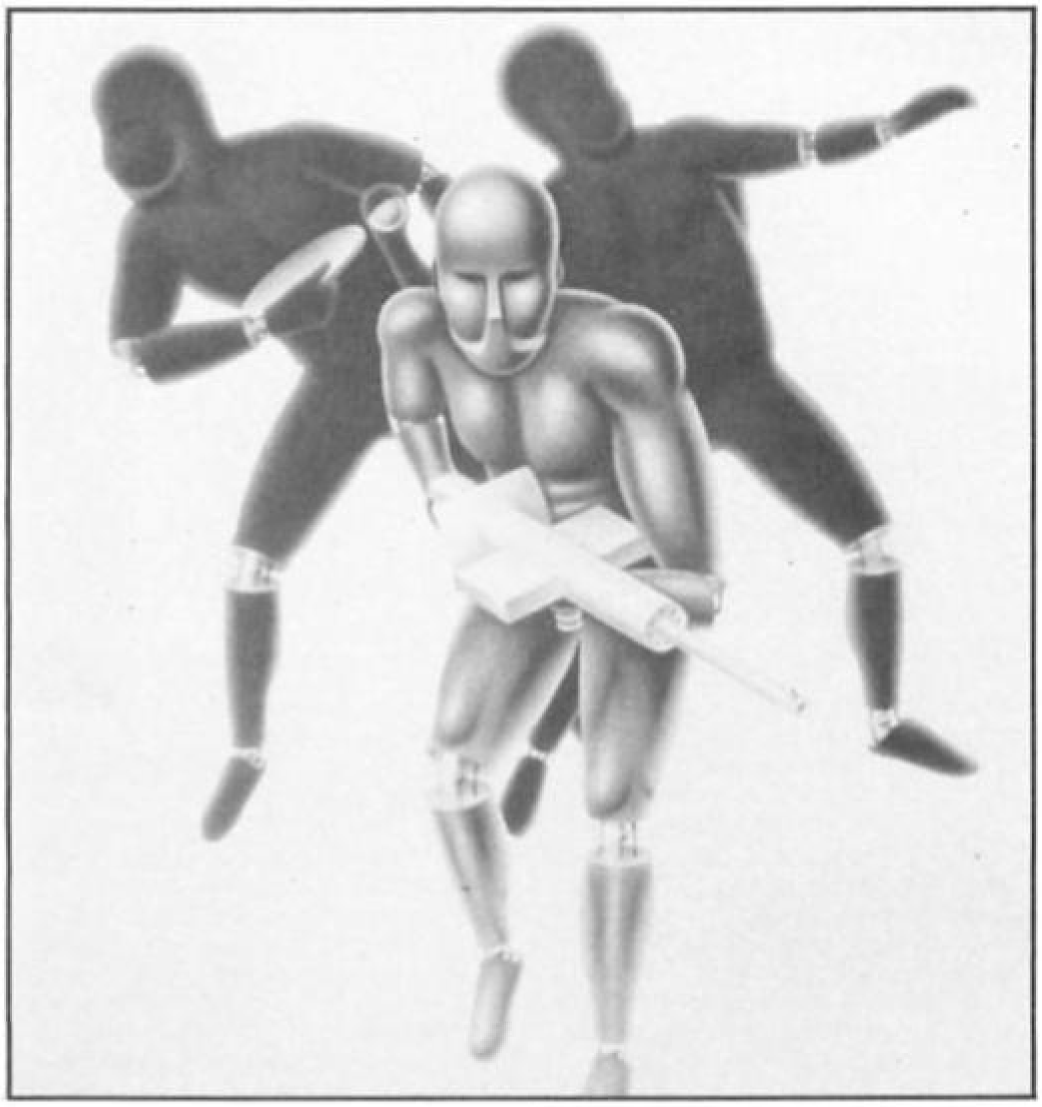
The graphics and animation are all quite good, although Myrtle is prone to a bit of flicker at times. The playing area seems extensive and working out how to reach Gordon could well give you a challenge if only you can stay alive long enough to give it a good try.

Mermaid Madness is very well presented, and there's an enjoyable *game in there some*where, but I'm afraid that only having the one life spoilt it for me, as I soon became irritated at constantly being killed off. Not having three or four additional lives to play with seems to me to be a serious flaw (especially as it's the sort of thing that can probably be cured with a few simple POKES). Oh, and then there's the price. With Mastertronic turning out games like Knight Tyme for just 3, 10 for Mermaid Madness is just far too expensive.



One combat droid, a computer to repair, over 100 rooms–a simple recipe for an addictive shoot 'em up with just a smattering of strategy.

T·U·J·A·D



Tujad
Ariolasoft/Orpheus
£8.95

Every now and then a game appears which contains familiar elements and, on paper, sounds less than startling, but once you start of play, it exerts a mystifying hold which is difficult to explain. Tujad is just such a game.

The game play has a touch of *déja vu* about it. You control a Gen 19 combat droid who must repair the computer system, Tujad, by collecting 50 pieces of circuit board strewn through over 100 rooms. The computer however, treats your droid as an intruder and despite your good intentions will try to vapourise your mechanical samaritan.

Along with the circuit board segments, three types of weapon, extra lives and extra energy can be picked up as you negotiate the maze. At the beginning of each game all these items are resituated making a definitive route difficult to plot. As your convincingly animated robot walks and hovers around he is beset by small flying nasties who sap its energy, and at the gates of some rooms are aliens who destroy you on contact. These can be neutralised by selecting the correct weapon from your stored armoury of collected weapons. Pick the wrong weapon and you'll waste valuable ammunition and be unable to gain access to other parts of the complex. As all your weaponry is fired from the same button be sure to reselect each time you need to fire because you need all the available firepower to get close to finishing the mission.

At various points there are transporters which will materialise you elsewhere within the system and these, unlike the collectable elements, are in the same positions each new game.

The graphics are bright and well detailed and the droid itself is enjoyable to steer. The strategy element is just enough to raise it above the norm. All this doesn't really explain why Tujad is immensely compulsive to play. The answer may be in its simplicity. After just a couple of hours I'd managed to complete over 50 per cent of the game. That might put off those who judge value for money in relation to the wasted hours they spend before they get anywhere, but should encourage those who don't enjoy frustration to try it.

I would thoroughly recommend Tujad for anyone who wants a satisfying and simply enjoyable game.





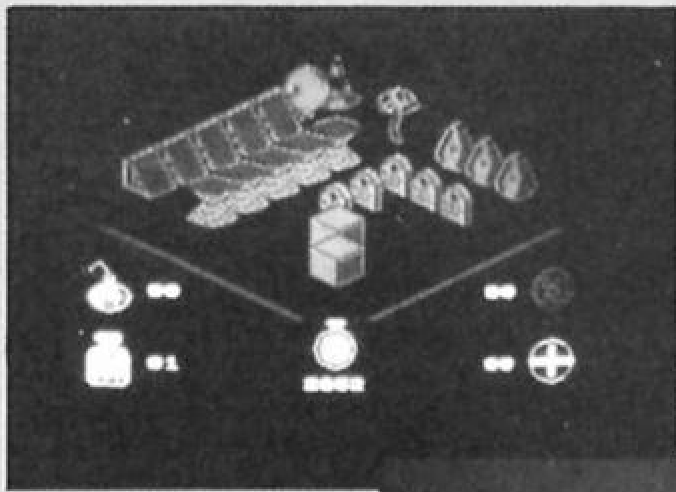


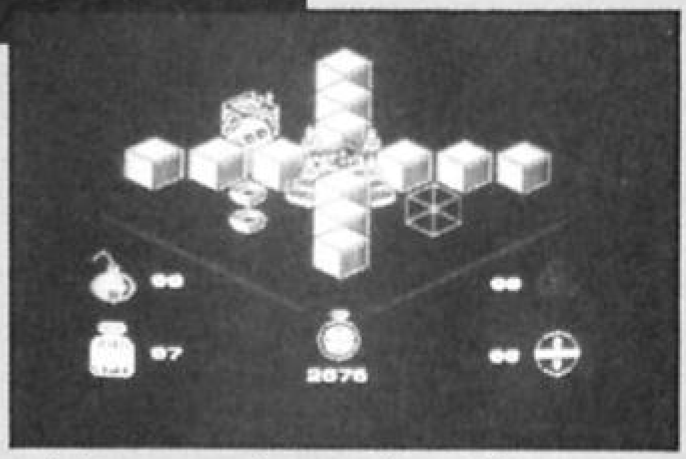
GREAT

MOLECULE MAN

Molecule Man
Mastertronic
£1.99

Customise your own maze game for a budget price.





Not another 3D maze game! 'Fraid so. This does have two saving graces, though: it's cheap and it has a built in maze designer.

Molecule man is trapped in a maze containing 256 screens of deadly radiation with only his wits separating life from death. Time can be bought but the price is high and the Banks are closed.

Our globular hero soon finds that the pathways may not be paved with gold but they are sprinkled sparingly with small change. As you guide Molecule Man through the lethal landscape he finds the occasional discarded pound coin which can be used to buy anti-radiation pills or bombs.

The pills are essential to Molecule Man's life support system because they dispel the effects of the radiation which is gradually sapping his strength. His energy level falls at such an alarming rate that the search for coins is a constant concern. The pills are dispensed by cuboid machines which are not always positioned at convenient places. Like the pills, bombs are dispensed from special cubes and also cost a pound each.

Now the Damoclean nature of the becomes apparent, you must decide whether to buy a pill or risk buying a bomb. Make the wrong decision and you will die from radiation sickness and have to start again.

Why has Molecule Man chosen to come to such an inhospitable land? He's no fool, he didn't choose his fate and is looking for the way out. He knows that this is done by using the teleporter but first he must find the 16 circuit boards which will make it work. This he must do against all odds and with time ticking away speed is essential.

In this maze you must plot your way on paper. All you know is that the maze is designed on a grid which is 16 screens wide by 16 screens deep. After collecting all of the circuit boards Molecule Man must find his way to the teleport pad to make his escape.

When you decide you've had enough or eventually complete the maze, you can move on to designer program.

The designer is a separate program on the tape but mazes created here can be loaded into the main game at the beginning of the session to replace the original puzzle.

Each screen is created individually on a composing grid but, by moving the cursor off the edge of the displayed screen, you can scroll to any of the other screens around its borders to see how one pathway relates to the next screen. In this way continuous paths or deliberate barriers can be created.

A menu is displayed on the left side of the screen to allow you to choose the type of obstructions required. Initially this shows 14 different objects but there are two further menues giving a total choice of 42 characters. The only two factors to be taken into consideration are the number of circuits and the starting position of Molecule Man.

If 16 circuit boards have not been collected, the teleporter will not work in the real game. So planning is essential. This is helped by the ability to print out an overview of the maze. This is a horrifying prospect because it makes you realise the complexity of Molecule Man's task but it does solve the problem of mapping it all out yourself.

There is only one Molecule Man and he can be placed anywhere on the grid as a starting position. All that remains is to save the map to tape and reload the main game.

The Designer only shows the game in a 2D representation. Only when your own game is fully loaded can you appreciate your creation to the full. If there are any points which need to be changed, then the whole map can be reloaded into the Designer and changed until you create your own ultimate challenge.

At the end of Mastertronic's tape is a map which can be used as a starting point for your own design projects. If you've played the set version it may look familiar. By chipping away here and there you can alter a stage or two to customise the game to suit your own needs if a full blown remodelling session does not appeal.

In Molecule Man you have a very difficult challenge combined with a game creator at a price which makes unbelievable value.



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The Golden Trivia Challenge



Will you be the ZX Trivial Pursuit Champion and go on to the solid gold prize?

To celebrate the launch of their Trivial Pursuit computer game, Domark have decided to mount the Golden Trivia Challenge in which a number of computer mags will be searching for their own Trivial Pursuit champion. And, when each magazine has found its winner, all the winners will go through to the Golden Final where they will have a chance to win a copy of the board game with solid gold playing pieces. All the trays, dice and playing segments will be craftsman-made from gold and valued at around £10,000!

The Prizes

Our winner will receive a copy of the Trivial Pursuit — Genus II Edition board game, plus an all expenses paid trip to London to attend the Golden Final in November.

The first four runners up will also receive copies of the Genus II Edition board game, and for a further ten runners up there are prizes of Trivial Pursuit After Dinner Mints, so you don't have to win the Golden Final to win a prize.

The questions in Trivial Pursuit fall into six categories; Science and Nature, Entertainment, History, Sport and Leisure, Art and Literature, and Geography. So, to enter the Golden Trivia Challenge we've set six questions for you to answer, covering the range of subjects that you've got to be familiar with if you're to be any good at the game.

Answer these questions, and then there's a tie-break to complete as well. For this, you have to think up a Trivial Pursuit type question that could be used on a data tape of questions for the computer game. And remember, good questions contain a clue or twist of logic in them, such as this question from the Baby Boomer Edition; who had a lightning No 1 hit with 'Something In The Air'? (answer — Thunderclap Newman).



Questions

1) Science and Literature
What do Palaeontologists study?
2) Entertainment
Who has won the most Oscars?
3) History
What was the date of The Fire of London?
4) Sport and Leisure
Who has won the most Wimbledon titles?
5) Art and Literature
Who wrote Stranger In A Strange Land?
6) Geography
Which country used to be called Ceylon?



ZX Golden Trivia Challenge

1 ....

2 ....

3 ....

4 ....

5 ....

6 ....

My tie-breaker question is: ....

....

Name ....

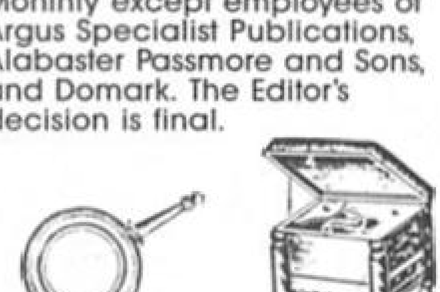
Address ....

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Send your entry — by 3rd October 1986 — to Golden Trivia Challenge, ZX Computing Monthly, 1 Golden Square, London W1R 3AB.

Once you've answered all the questions and filled in your tie-breaker on the coupon, send your entry in to Golden Trivia Challenge, ZX Computing Monthly, 1 Golden Square, London W1R 3AB. Entries must arrive by first post on 3rd October 1986, and the competition is open to all readers of ZX Computing Monthly except employees of Argus Specialist Publications, Alabaster Passmore and Sons, and Domark. The Editor's decision is final.





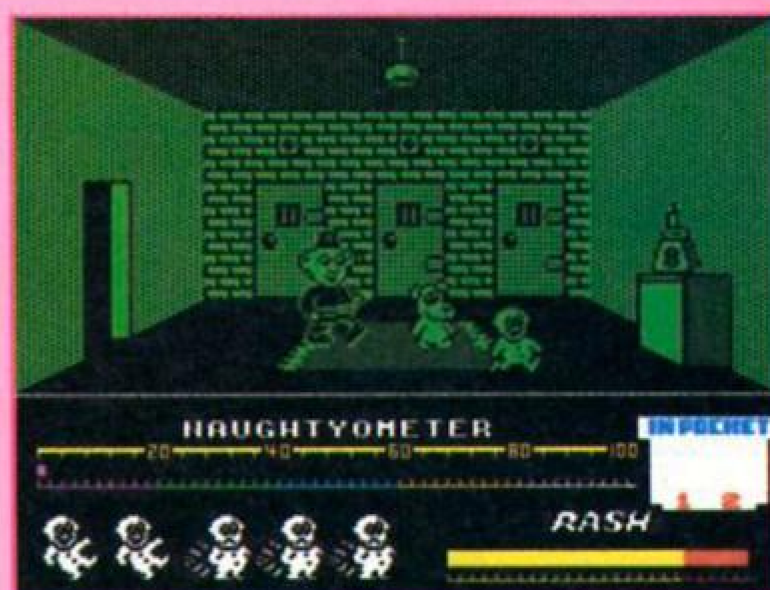
JACK THE NIPPER...



Here's a chance to relive your misspent youth, courtesy of Gremlin Graphics.

Jack the Nipper
Gremlin Graphics
£7.95

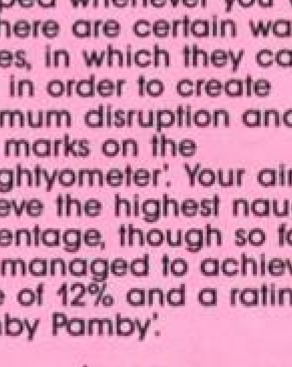




With Jack the Nipper Gremlin make a slight change of direction, away from the arcake action of their recent releases. I'm not quite sure how to describe this game — you can fire at things, and bounce around the screen, avoiding monster and leaping over platforms made from items of furniture, but it's not a conventional arcade game (although it is similar, in some ways, to Mikrogen's Dummy Run game).

You take on the role of Jack, a cute looking character who goes around creating as much haoc as Dennis the Menace. Jack is free to roam around town and sneak into all the shops and buildings that he comes across and it's your task to ensure that wherever he goes, he leaves a trail of chaos and destruction in his wake.

Scattered around town are a number of objects that Jack is just dying to get his grubby little mits on. There are pea-shooters, tubes of glue, sacks of fertiliser and other potentially lethal items all of which are just waiting to be used on potential victims. Inside his nappies Jack has room to hold two objects and these can be picked up or dropped whenever you want, but there are certain ways, or places, in which they can be used in order to create maximum disruption and score high marks on the 'Naughtyometer'. Your aim is to achieve the highest naughtiness percentage, though so far I've only managed to achieve a score of 12% and a rating of 'Namby Pamby'.





The games graphics are interesting — the display looks two-dimentional but by moving up/down you can simulate three dimensional movement into/out of the screen and this allows you to dodge around the characters and creatures that are wandering around and getting in our way. There is an assortment of the town's inhabitants, as well as ghosts, dogs and some funny looking blob thingies. Contact with these isn't fatal, but it does give Jack nappy rash and when the 'Rashometer' goes past the danger level Jack loses one of his lives. The only drawback here is that some of the sprites used for these characters can stick to Jack like glue regardless of how hard you try to dodge them, and this can waste you a lot of lives in a short time.

Use of colour has been kept to a minimum to avoid attribute clashes, and this has allowed the programmers to draw some quite large and detailed figures for Jack and the townsfolk which help to give the game a bit of character. Jack's main weapon is a pea-shooter with which he can tot up a score on the naughtyometer and it's fun watching the cute little sprite going around firing it at everyone he comes across. In fact it's probably the novelty of the game, its theme and style of graphics, that make it as enjoyable as I found it. The instructions could be a little clearer as I found it a bit irritating to have to play for quite a long time before I began to see what I was supposed to be doing, but after a while I did start to find the game fun. It's quite simple and enjoyable, though perhaps not quite up to the usual standard of Gremlin's games.



Tremor

Budget games are getting better all the time, and US Gold are joining in with their latest game.





Tremor
US Gold/Americana
£2.99

US Gold's budget label didn't get off to a wonderful start, but now, with Tremor, it looks as if they might be able to start competing with Mastertronic in the budget goodies market.

Tremor is set beneath the surface of Orephul, the moon of the planet Ozbos. The Ozbosians have been carrying out mining operations on Orephul for many years, protecting themselves from the moon's radioactive atmosphere with the aid of ten 'qigits' placed at various points beneath the surface. But recently a passing meteor has caused seismic tremors which separated he qigits from their nuclear stabilisers, and it's up to you to trace the qigits and return them to their respective stabilisers.

In order to complete this task you have been given control of the new, improved, Miracloid 'Droid. Armed with a high-power Mattasplatta and Ultraboosta, which allows you to leap over obstacles, you enter the underground caverns and begin the search. The mining complex consists of 400 caves, populated by the deadly organisms which have been mutated by the high radiation level. Other items to be found in the caves include a Thrustapac, which enhances your leaping abilities, batteries which recharge the 'Droid's energy (to give additional lives), moving platforms and 'tellyport' stations which can transport you to other areas in the mine.

The game's instructions come with a useful map which gives you some idea of the locations of objects. This helps you to get started and allows you to play the game without the chore of having to make your own map, but the map provided doesn't give away all the game's secrets so you've still got the challenge of finding the objects and delivering them to the right spots.

Finding your way around the mine isn't as easy as it might sound because your leaping abilities are quite limited until you find the Thrustapac, and this means that you've got to do a lot of exploring, and take a few risks in order to find the things you need before you can complete the search.

The graphics and animation are better than you might expect in a budget game, and compare well with the standard of a lot of full price games. The combination of the search for the qigits, combined with the game's shoot 'em up element make Tremor enjoyable and addictive, and the size of the mine complex should keep you busy for a long time.

Tremor is very similar to games such as Starquake and Nodes of Yesod, but costs less than half the price, so it's obviously good value, and only one or two minor points stop the game from going all the way to Monster Hit status. The monsters in the caves are instantly deadly, and as there are so many of them it's hard to get very far without getting killed all the time. This might not have been much of a problem if it weren't for the fact that the monsters will sometimes appear in the cave right next to your 'Droid, so that there simply isn't any chance to zap them before they get you. I think it would have been better if the monsters only drained some of the 'Droid's energy levels on collision. This would allow you to survive a few collisions before losing a life, and also give you a little more time to react when one appears right on top of you.

Even so, Tremor is still a good game and, before the recent upsurge in the quality of some budget games, might well have been released at a higher price. For just £2.99 it's very good value and is probably one of the better budget titles currenty available.

MONSTER HIT

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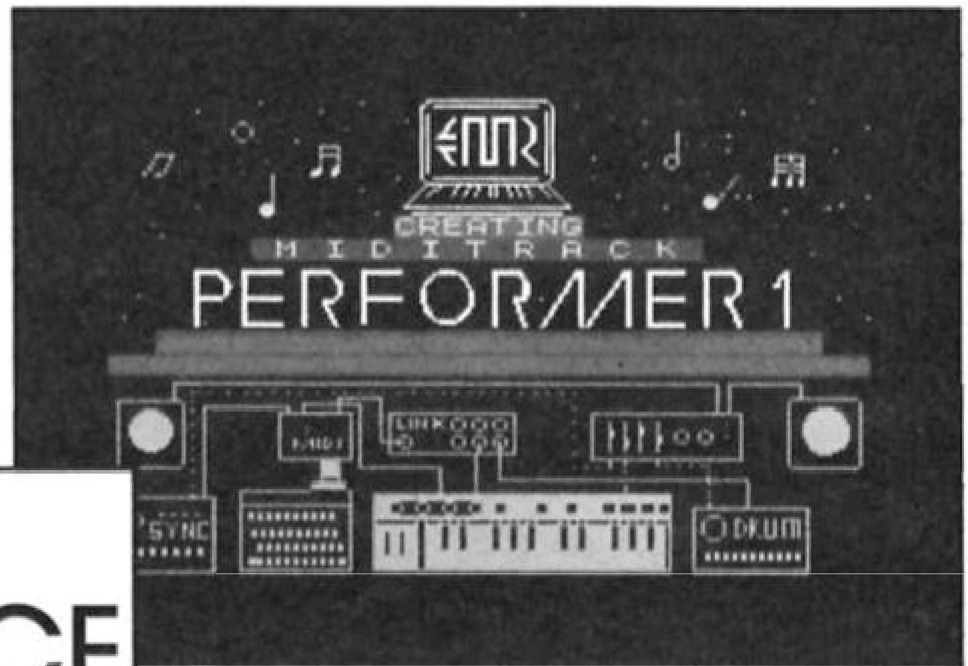
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HARDWARE



COMMAND PERFORMANCE

The Performer
Electro Music Research
£129.95 (MIDI interface and software package)

The MIDI interface connects to the back of the Spectrum and attached to it by a ribbon cable is the main unit. This fitted with five 5 pin din sockets, a MIDI IN, three MIDI OUT's, and a clock start/stop.

These are for connection to a keyboard or syntheziser that is fitted with similar MIDI sockets.

Instruments

I think a brief description of the suitable instruments is in order. Provided the instrument is fitted with the MIDI interface it could operate in one of three ways:
OMNI mode. All information over all 16 channels is accepted and acted on if the instrument can do so.
POLY mode. Only information on the channel selected is accepted and acted on.
MONO mode. Only one single voice is sounded per channel.

There are 16 midi channels and depending on the mode, as many voices as the keyboard or synth can play can be sent on each channel. Keyboards, such as the JVC KB600 or Yamaha PSR series tend to operate in OMNI mode only and cost from around £500.

Synths such as the Siel DK80, Korg POLY 600, Yamaha DX and Casio CZ series tend to operate in either omni or poly mode with only the most expensive, and curiously the CZs featuring mono. The CZ101 at around £250 is one of the cheapest and best intruments around for home use.

EMR Performer

The performer program provided with the interface gives you the facilities of an eight track recording studio, except of course, the "music" is recorded as digital information.

This can be replayed back through the intrument(s) and here there is more flexibility than on a tape recorder. Tracks can be shunted round to different instruments by altering the channel assignments, different patches and sounds can be tried and speeding up and slowing down doesn't cause the tone to shift from Paul Robeson to Pinky and Perky.

Most functions are controlled from the main display and are cursor selected. Some options — save, load, tempo, channel, pitch, transpose etc need specific inputs and you are cryptically prompted for this.

A tremendous selection of control features are provided and this is a very powerful tool indeed. Even bounce down of up to 7 tracks into one can be done.

The main fault is that there is no "punch in" or "drop in" function and it is most frustrating to make a mistake at the end of a long sequence and then have to replay the lot!

Due to this I would say that this program is essentially for the experienced or competent musician. I believe they market a step time program for those of us that are not so able and maybe we'll review that sometime.

Two minor grumbles are that sometimes input prompts seem obscure until you become used to the program, and secondly it is possible to crash it unintentionally. If the display has been currupted and a lot of music has been stored then it is a case of reload from the start.

On the positive side, this is the only I/F and software which I have used that will trigger my RX21 drum unit.

Overall

A superb unit for the expert musician and the benefits far outweigh the negative comments. I have also used their DX7 (and TX7!) software and highly recommend this as well, I would like to see their composer and print program sometime!

BEAT THE ELECTRODRUM

SpecDrum Electro Kit
Cheetah Marketing
£4.99

Oh wow! You can forget all that latin rhythm nonsense that Cheetah started with their recent Latin Kit for the SpecDrum, this is what we've been waiting for. The Electro Kit programs eight new drum 'voices' into the SpecDrum and they're all megafunky electronic sounds that should automatically work their way into the minds of anyone this side of rigor mortis.

For those of you that don't already own a SpecDrum (there goes your street cred) I suppose that I ought to explain how it works. The package consists of an interface that plugs into the spectrum and connects, via a phono lead, to your stereo amplifier. Then, once you've loaded the controlling software, the SpecDrum allows you to overcome the Speccy's non-existent sound chip and

produce three-channel drum music.

The software comes in two parts; first there's the main music writing program which allows you to create your magnum opus, and then there's the 'Kit'. This is a chunk of code which contains the information used to create the actual sounds that you'll eventually hear, and provides the SpecDrum with a 'kit' of eight different drum sounds.

The clever people at Cheetah wrote the SpecDrum software so that this kit could be loaded into the machine separately which allows you to store different sets of drum sounds on cassette and load whichever set you want into the SpecDrum (though there's a limit of just eight sounds that can be used in any one kit').

The standard SpecDrum comes equipped with its own kit of voices and the Electro Kit is the latest addition to the range of new kits that Cheetah are committed to producing, and it's got some pretty good sounds in it. The best one is 'PEOW', which sounds just like it reads — a sort of electronic ricochet sound that gets used a lot in breakdancing music. Then there's 'Lo Tom', a thumping deep bass sound that'll get your bedroom floor shaking while the family are watching East Enders downstairs. I also liked 'Claps'. This is a nice gritty clapping noise, the sort of thing that comes in as a loud offbeat in a lot of disco records.

Those three are my favourites, but the kit also contains 'Kick', 'Snare', 'Hi Tom', 'Hi Hat, and 'Cymb' sounds that can be added to provide a bit of spice to your music. I must admit that 'till now I've admired the idea behind the SpecDrum but that I've never heard any home-made music on it that would outdo any decent professional recording. But after jamming around on the Electro Kit for just a short while I'm hooked.

It seems as if you only have to throw a few notes together to get good results with these sounds, and you certainly don't need to be Michael Jackson to come up with somthing that's fatally catchy. If you're at all interested in music then it's probably worth buying a SpecDrum just so that you can use the Electro Kit. What more can I say?

GET ON THE NETWORK

VTX 711/Voyager
Modem House
£119.90



Do you feel trapped in your computer room? Do you feel the need to communicate with sentient beings? If you do then a modem could be just what you're looking for.

The next mountain to climb is the substantial heap of jargon and the capital outlay, or that's how it used to be before the VTX 711/Voyager package came along. Modem House's latest unit is a little gem in many ways but it does seem to have one main flaw. I discovered this when I tried to plug it into my Spectrum Plus — it doesn't fit! To be fair the software does allow for printer dumps so I presume they intended the VTX 711 interface to be connected to some sort of motherboard — but not everyone has a printer or a motherboard.

Apart from this irritation, the package is extemely versatile and offers facilities which more expensive comms packages lack.

The interface is accompanied by a software package which incorporates three programs. The first is Viewterm which is a Prestel terminal emulator. Then comes Newterm, a full duplex system, and a Prestel telesoftware downloader called Teleterm.

Teleterm is the simplest of the three programs and requires the ability to use a telephone to call up your local Prestel number. For some people this may mean buying a two-way adaptor but if you have an extension phone this would do instead.

The other two packages include autodial systems and, once you've entered your most used numbers, the whole program can be resaved with the new directory safely stored inside it. this greatly simplifies the task of logging on and this is further aided by allowing macros to be stored too.

A macro is a command string, such as your personal code, which simplifies the tedious task of logging on, or it can include codes to help you reach your favourite screen quickly.

These programs also allow you to save, load or printer dump your favourite screens. The Prestel version additionally allows you to carousel up to 26 screens in the computer's memory. Beyond this the Prestel program does little else and is ideal for novices.

As your knowledge of systems increases the Newterm program will become your main form of entertainment. The program can cope with whatever parity, data bits or stip bits need to be set for a particular system. In addition local echo, screen scrolling and ASCII file transmission or reception can be accessed. The program differs from Viewterm by its lack of double height characters and colour, but Prestel can still be called up using Newterm.

Although the specifications for this system are impressive, the actual hardware could be better designed. The interface has an Amphenol output lead which is positioned at the top, left hand side of the unit with Baud rate transmit/receive switches positioned beneath it. If these positions were swapped the switches would be easier to reach and the stability of the interface improved.

The mains lead to the Voyager is also annoying. When I placed the unit on the edge of my desk the lead did not reach the floor. I ended up with the modem on the floor and the computer precariously balanced on the edge of the desk. The telephone connector is amply long enough so why skimp on the mains lead?

I still recommend the system very strongly despite these niggling oversights, after all they are easily surmounted. Further details may be obtained from Modem House, 70 Longbrook Street, Exeter, Devon EX4 6AP.

star PRINTER

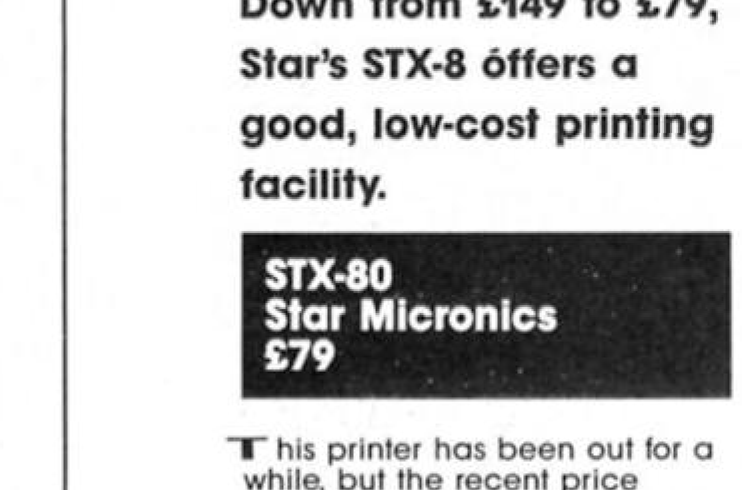


Down from £149 to £79, Star's STX-8 offers a good, low-cost printing facility.

STX-80
Star Micronics
£79

This printer has been out for a while, but the recent price reduction to £79 makes it a very interesting proposition for Spectrum and QL owners.

The STX-80 is a medium sized stumpy white box which looks neat and tidy. Several operating features contribute to this and I'll go into them later, it is large enough to look like a "real" printer yet compact enough to fit into a home user's limited space.



At this price there are bound to be limitations and the first one which will no doubt put many off, is that it works by using thermal paper. But those with memories of Sir Clive's noisy, unreliabe, smudgy, indistinct, temperamental ZX Printer should not allow this to bias their opinion of such machines, especially this one!

The printer uses rolls of paper 8.5 inches wide and this will cope with up to 80 characters per line. The paper is smooth, slightly shiny and pure white. Ink can be black or blue depending on the type of paper you purchase.

The manual takes great pains to cater for the computer illiterate and explains everything in great detail, so no difficulty should be experienced setting things up. The STX-80 is centronics ported and you will need an interface to connect it to your Spectrum. We used the Kempston Centronics E and the Euroelectronics ZX Lprint 3 with it and it worked perfectly with both. These cost £49.95 and £39.95 respectively and both contain their own built in software which makes using them very easy.

Options

The options are rather limited, an enlarged character function is provided, line feed and form feed, three line spacing options, Carriage Return, block graphics and switch to Bit Image mode.

Six DIP switches are fitted and these control 12 or 11 inch page length, Auto or manual line feed, 7 or 8 bit interface, and three switches which, depending on the combination of ON/OFF allow selection of USA, Swedish, English, German, Dutch, French, Italian or Spanish character sets. Although limited, this does in fact represent a good choice of options, especially considering the price.

Bit image mode operates on 480 dots per line, which means that you have to limit yourself to 48 characters per line if using TASPLUS or a similar package, and some screen dumps may loose the last bits off the right hand edge of the picture. Note that the normal Tasword 64 character line is easily dealt with, and the QL Quill 80 characters per line mode works well. Characters are formed on a 5x9 matrix, while the block graphics are formed on a 6x6 matrix. 7 or 8 pins can be used on BI mode.

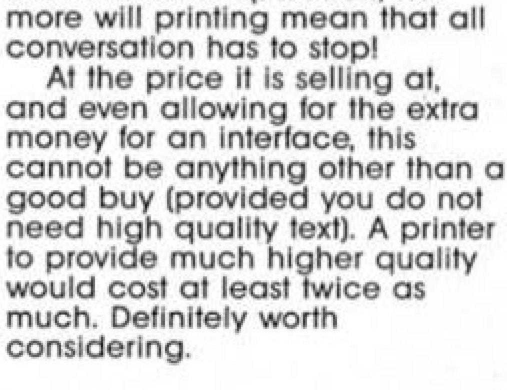
In use

The first thing that struck me was the almost silent mode of operation, I thought it wasn't working until it made a slight burp as it advanced the paper one line! Even though it uses a roll of paper, it actually counts lines per page and so any software using set page lengths — eg. Quill — will operate without problem. The printing speed is rather slow at 60 CPS and the print quality is rather basic.

This is not really intended as a document quality printer but it is good enough to produce excellent listings, good screen dumps and acceptable text.

The fact that it uses a roll of paper contained in a compartment at the back makes it a very tidy machine (no lengths of tractor feed paper to get under your feet!) Another great advantage is the almost silent mode of operation, no more will printing mean that all conversation has to stop!

At the price it is selling at, and even allowing for the extra money for an interface, this cannot be anything other than a good buy (provided you do not need high quality text). A printer to provide much higher quality would cost at least twice as much. Definitely worth considering.



CROSSWIRES

Ray Elder with more soothing antidotes for hardware hangups

Opus oddments

First of all I must mention a helpful letter from Stuart Horner of Foraits Software.

I am greatly indebted to them for the following information as many of us are still struggling with the mysteries of the Spectrum 128 and the RS232 and printer operation.

One way of enabling the printer for use via the RS232 in 128 mode is to POKE the BAUD system variable at address 23391 with a value calculated by the following line, note "baud" refers to the value given in your printer manual as the recommended Baud Rate for the printer. POKE 23391, (3500000/26*baud)−2.

Also there is a way of getting a screen dump on Epson compatible printers by first entering the given line and then typing RANDOMIZE USR 295. NOTE: This only operates in 128 mode!

Donald Easton writes from Scotland and is having problems with his Opus Discovery and Brother HR5 and Tasword 2. Having managed to get a working copy of TW2 onto disk and being able to save text file on disk he finds that using the MOVE command of the OPUS produces 80CPL instead of TW2's 64CPL. Result, untidy, unjustified text.

So I contacted Opus and they were superb in sending us a Discovery to experiment with by the next post. Unfortunately there was no printer connecting lead, so I'm still working in the dark. At least I have a manual to guide me!

I don't know if you've tried printing from within TW2 Donald, but this seems the most logical way rather than using MOVE. Having added the modification 15 OPEN£3;"b" and then using the option T from the menu accessed by pressing Symbol Shift and key A (STOP), resave the TW2 program onto a spare disk. This will ensure the port is initialised each time you reload TW2.

NEW your Spectrum and reload TW2 from your new copy, either type in or load some text and again go to the STOP menu and use the P option to print. Answer the three questions and see what happens!

If the result is still 80CPL then the other way would be to set the printer to print 64CPL. This is done by looking up your line length code in the manual and entering the following code. Note that the code in the second line is the standard Epson one, yours may be different.

```
OPEN£3;"b"
LPRINT CHR$(27);"Q";CHR$(64)
```

Now try using the MOVE system, or add the lines to TW2 (lines 15/16) and proceed as outlined above.

Sound barrier

Dear Sir,

Q *I own a DK'Tronics 3 channel sound device, a Spectrum issue 3 and I purchased an Opus Discovery Disk drive. Now my sound interface will only work with the BEEP instruction and not with the OUT 63. Can you solve my problem please?*
Richard Schmed,
Switzerland.

A Well we just got an Opus so I turned out our sound unit and what happened? The sound unit decides not to work at all!



Opus Disc drive dilemmas solved

All you can do is disconnect the Discovery and connect the sound unit and try it out. If it works as before with the OUT 63 commands then the two units are not compatible and there is nothing you can do.

However if it doesn't work then it has developed an unconnected fault, mind you, if it has and if you get it repaired there's still no guarantee until you try it out with the Opus that they are compatible! Sorry, not a lot of comfort I can offer.

Full stop?

Dear Sir,

Q *I have a Spectrum 128. Yes you've guessed it, problems with a Compact 8056 printer. I bought the printer separately and also a QL 8056 RS232 lead, I cannot get the thing to work at all, the most I get is either ? marks or inverted ? marks.*

The program you gave in an earlier issue won't work. Help!

A The program I gave was actually intended to be used in conjunction with an Interface 1 RS232, there may be one method of setting up your printer published elsewhere in this column, but if not enter FORMAT "p";1200 then try LPRINTing or LLISTing.

This will only work in 128 mode, hopefully we'll find out about the 48K mode soon. Watch this space...

QL queries

Dear Sir,

Q *I have two specific questions about the QL which I have not been able to solve:*

First, do you know a routine to use from SuperBasic to handle errors without breaking out of a program (such as an ON ERR...GO TO sequence)?

Second, how can I protect my cartridges from total copying, I have bought a number of programs (such as Chess, Cartridge Doctor and Wanderer) which will not boot without the master cartridge because there is a password or some such encoded on the master which does not transfer with the copy. Thank you for your assistance.
Melvin JP MacKaron,
USA.

A To take the second problem first, what these programs do is to have a code embedded into the Directory sector of the cartridge which is not transferred by the normal copying system, the first thing the program does is look for that code.

I am NOT suggesting that you are intending to pirate programs, but there are such people and to give full details on how to get round this would be irresponsible of us.

As a hint, you would have to use a program such as the Cartridge Doctor to examine and alter by embedding a code in the directory sector of the master cartridge and then, from machine code, look for it at the start of your program.

I hope this gives you enough of an idea how to proceed. As to the first, I am not aware of anything at the moment. Do any readers have a solution? We'd be pleased to hear from you.

THE WRITER

It looks like Tasword has finally met its match. Carol Brooksbank spreads the word.

There are so many Spectrum word processors around these days that a new one needs to be something really special if it is to make an impression on the market. The Writer will meet the challenge.

Two versions are supplied on the tape. One installs the full program, packed with facilities, on Microdrive. The other, tape based, lacks some of the features of the Microdrive version but is still streets ahead of any other tape based Spectrum wordpro I have met. It is very easy to use. It relies heavily on pull-down menus — arrow keys move the pointer, or it can be customised for the Kempston mouse or joystick — so there are only a handful of control keys to be memorised, and these are chosen to be as logical as possible. For example, = and = move the cursor to the start or end of a line. Most programs with a lot of options have me rummaging about in the handbook for weeks, but after an hour or so with The Writer it was as if I had been using it for years. The only irritant I found was that you can often only use one option from a menu and are then returned to the text entering mode. The menu must be fetched again if you want another option — maddening if it is header and footer, or Save and Verify.



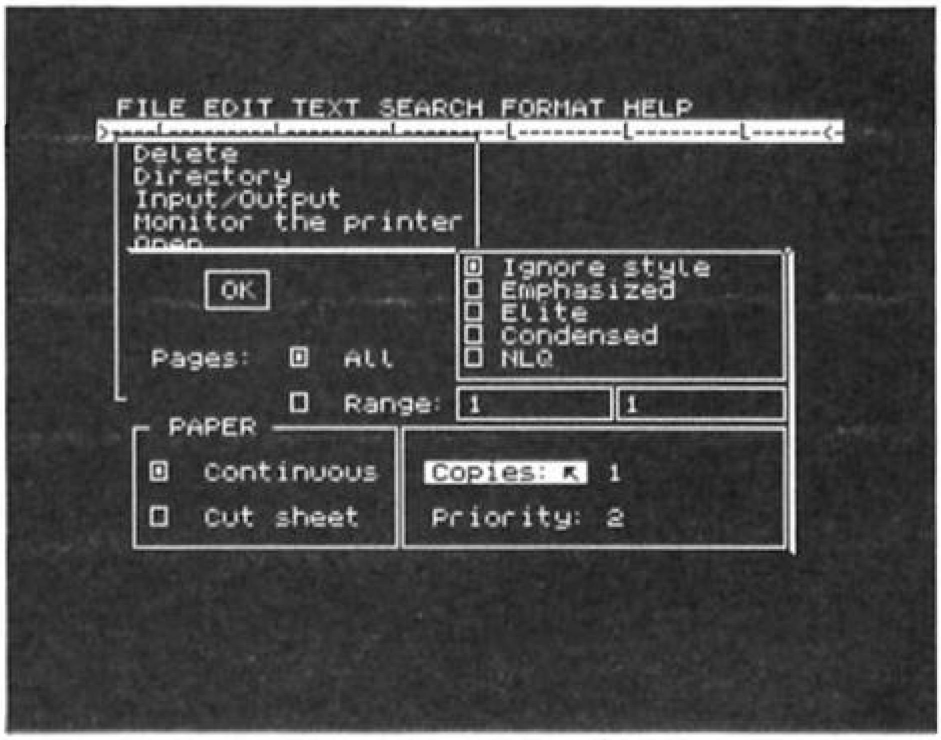
Interfaces

The Writer can be customised to drive any of half a dozen popular interfaces, but, surprisingly, not Kempston "S" or Tasman. The Epson printer control codes can be changed to suit any Spectrum compatible printer. If there is anyone around who wants to use a word processor like this with a ZX printer, it can drive one of those too. If your printer uses non-ASCII codes, all the printable character codes are re-definable. The installation program modifies the Microdrive version, but a separate customised copy must be saved if you are using the tape version.

On loading, the program goes straight into text entering mode. With Microdrive, the first operation is to select the Open option, which calls for a file name and drive number. If a file of that name is found on the drive it is loaded, otherwise the program assigns the name to your new text. Thereafter, whenever you use the Save option, the program is automatically saved on the specified drive under the file name. If an old file is loaded and modified, Save will delete the old copy and save the new under the same name. But don't give a new file a name already on the cartridge or the Open option will load the old one and your new text will be lost. Tape copies can also be saved and loaded.

Text

The text entering and editing facilities are superb, and all are present in both versions. All the usual cursor movement keys are available, as are letter, word, line and block deletion. You can switch freely between insert and overwrite modes. 64 columns are visible on the screen — and the small type face is crystal clear — but if your printer can take it, up to 127 columns per line can be used, with the screen scrolling horizontally as you type. Text can be left or right aligned with the other edge ragged, centred, justified, with or without wordwrap. Margins are adjustable and paragraph indents, if any, can be specified. If you want a group of words to be on the same line, special spaces can be entered which prevent a line break, so that the whole phrase will be transferred to the next line if necessary. Three ways of entering a 'newline' are available: one, rarely needed because of the wordwrap, simply starts a new line; one marks end of paragraph and moves the cursor to the indent position; the third acts like the end of paragraph marker, but also sends a printer control to start a new page. If graphics printer controls are entered in the text, the justification takes care of them automatically by entering extra spaces. The onscreen text is out of line, but the justification is preserved in the printed copy. For multi-line spacing, each press of E-mode/s respaces the whole text instantly. Change your mind, and E-mode/x removes a



Two of the 'File' menus controlling text output of the printer.



line from the spacing globally. Four types of user-definable tab are available, left aligning, right aligning, centring text round the tab point, and aligning columns at the decimal point. The space between text and the next tab can be blank, or filled with solid lines, dots or dashes. The ruler showing the tab points can be displayed at the top of the screen or not as you wish. Text capacity is nine pages, 483 lines.

Sophisticated Search and Replace facilities are offered. A letter, word or phrase can be searched for, and you can specify whether letters are to be found only if they form a whole word, or also include those forming parts of other words, and whether every occurrence is to be found regardless of type case, or only those with upper/lower case exactly as you typed them. You may elect to have every occurrence replaced by another word or phrase, in which case each paragraph will be automatically re-formed, or you can stop at each one and choose whether to change it.

The printing format allows numeric, upper or lower case roman, or upper or lower case alphabetic page numbering. Headers and footers can be centred, left or right aligned, or alternating, and can include the page number or not as required. Page breaks can be defined in the text, or can occur after a specified number of lines. The type style can be the one currently selected in the printer, or one of four other global styles offered if your printer can produce them. Printing is continuous unless the cut paper option is chosen, when it will pause at the end of each page for paper change. Multiple copies can be printed, and the screen can show the copy and page number reached. All or part of the document can be printed. While the printing is going on, you can add text at the end or start to type another document.

All these facilities are available to both tape and Microdrive users. The one absent feature is a wordcount. It is an astonishing omission in a program as sophisticated as this, and we can only hope it will be remedied in future enhancements. The publishers plan to produce modifications to allow the use of a wider range of mice and joysticks, and a disc version.

Microdriving

For the Microdrive user, there is more. A series of help pages put almost all of the handbook on screen. A communication program allows text to be transmitted, via RS232, not only to and from other computers, but also other word processors, like Wordstar. Also, the text can be converted to an ASCII file for transmission or for saving on tape, and an ASCII file can be received and converted to a Writer microdrive file. (For Tasword Two files, there is a special conversion program, available also to tape version users, to allow the files to be loaded into The Writer.)

Microdrive users can also save sections of documents separately, and text blocks can be transferred between documents or files merged. Frequently used text, like your own address, can be kept as a file and merged into all your letters.

The Microdrive version offers a splendid mail merge facility. The text and the file from which information is to be taken must both be on the Microdrive. The file can be a simple one created using a BASIC program given in the handbook, but Softek are planning to bring out a compatible program, called The Filer. In addition to simply entering file data into the text, this mailmerge allows calculations to be performed — perhaps taking a nett price from a file, adding VAT, deducting a discount and printing the total arrived at in the letter. Conditional printing is allowed — a letter could be written only to those customers who have made a purchase in the last five years. String variables can be added, either globally for something like the date, or individually if you wish to put some personal note in each letter.

The 128 version can hold five documents in memory simultaneously, and text blocks can be transferred freely between them.

The winner. . .

Inevitably, The Writer will be compared with Tasword 3. For my money, The Writer wins. Its text editing features are better, and the onscreen typeface clearer. The tape version makes it available to a wider market, and is cheaper than Tasword. In addition, there is the exciting news that it is the first of a series of compatible business programs, to include a file program and a spreadsheet. It should also be compatible with The Artist II, and a database program is planned to allow page layout planning for the production of illustrated reports, magazines etc. The whole suite will make the Spectrum a business computer able to handle the requirements of any small, and many not so small, businesses. While software like this is being produced, don't let anyone tell you the Spectrum is only a games machine. . .

THE PROFESSIONAL TOUCH



This month, Hewson's Steve Turner looks at the merits of structured programming.

Structured programming is a method of organising the process of design and coding. There are some other popular methods — such as flowcharting — but I have found that the structured approach is by far the best method for most programs. It leads to a clearer understanding of the task the program has to perform. If you can decide WHAT to do then it is much easier to decide HOW to do it. The advantages of structured programming are as follows:

1. Breaks down an unmanageable task into simple sub-tasks.
2. Leads to a disciplined approach to coding. Each routine has a particular defined function.
3. Routines take on familiar shapes and thus become easier to code.
4. Leads to less errors and a more amendable result.

Elements of Program Language

Any method of describing a task, whether it be a computer program or the instructions to build a greenhouse, consists of three elementary types of instruction.

1. Sequence
One instruction simply follows another. Computers execute instructions sequentially. Figure 1 shows how we represent this in a diagram. Each box represents a task. The sequence reads from left to right across the page NOT down like a flowchart.

2. Conditional task
IF condition **DO** task. Program languages all include a means of executing a task only when it is required. In a higher level language such as BASIC a whole statement can be made to execute conditionally. In assembler the only conditional instuctions are the ones telling the computer which instruction to execute next, such as jumps, returns and calls. It is recommended that only conditional jumps are used. Figure 2 shows a diagram of an IF box. Note that all multiple conditions can be reduced to this simple form. Figure 3 shows a compound IF structure:
IF condition **DO** something
Else DO something

Figure 1. Sequence

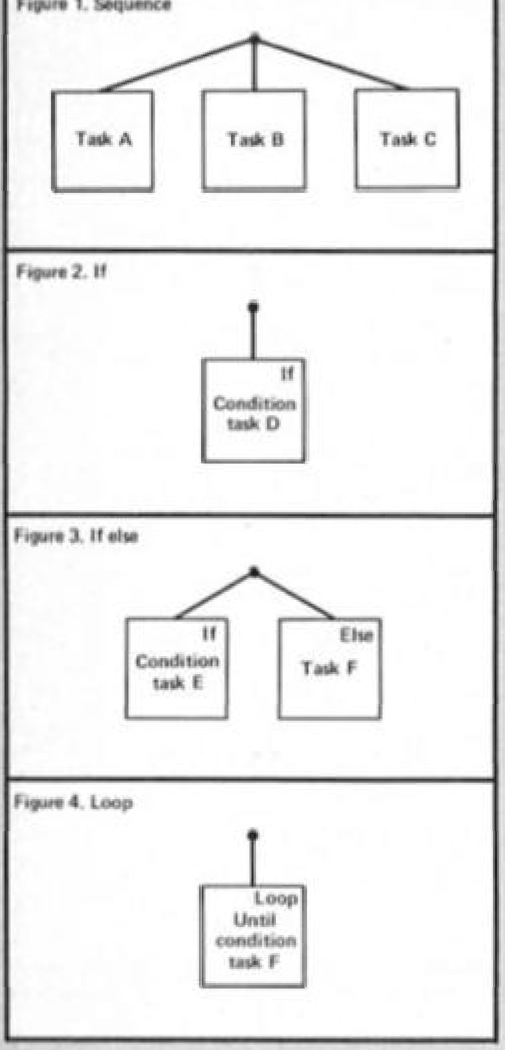


Figure 2. If

Figure 3. If else

Figure 4. Loop

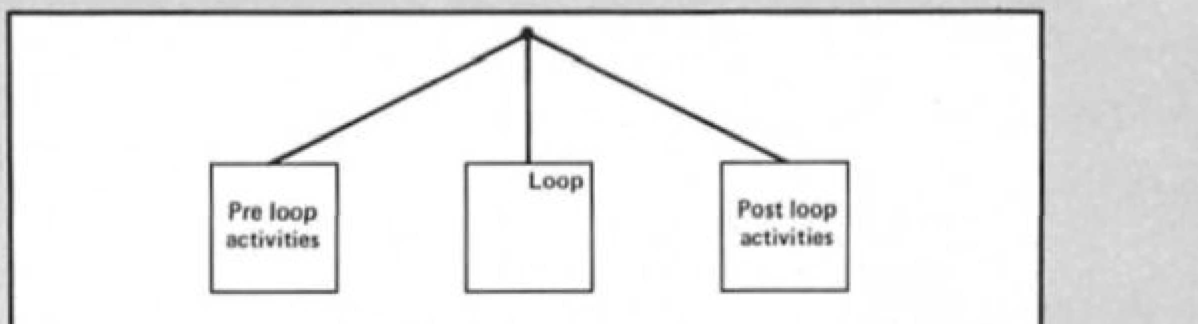
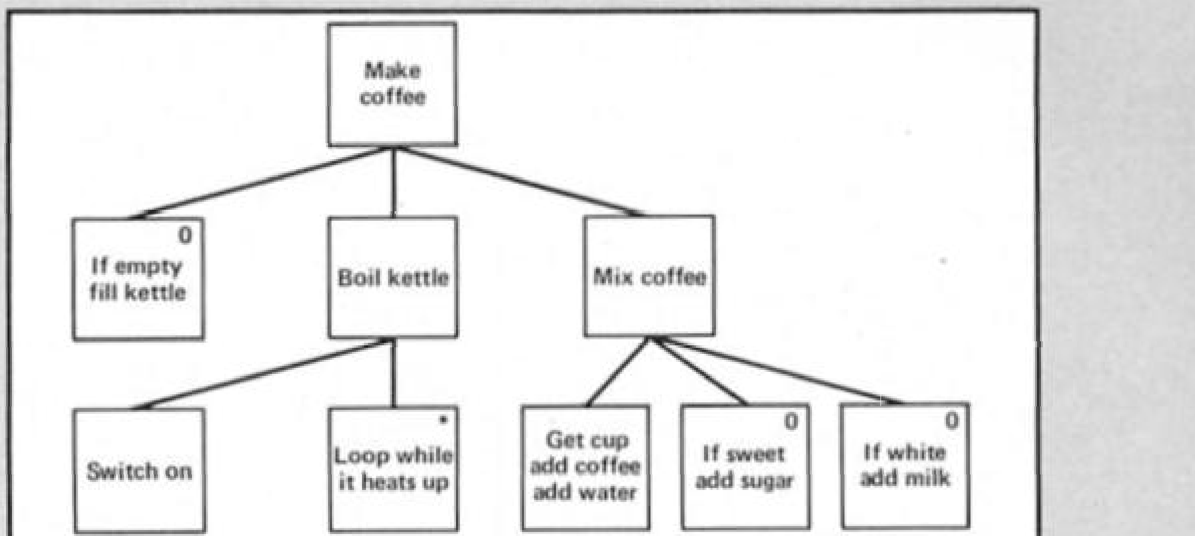


Figure 5. General loop structure



Note: * = Shorthand for loop
0 = shorthand for if

Figure 6. Make a cup of coffee

3. Iteration or loop
DO task **UNTIL** condition.

This allows a task to be repeated as many times as necessary. In BASIC the FOR statement caters for this. In assembler we can construct this using two 'jump' instructions. One is at the end of a task and causes a jump back to the beginning of the task. The other is an exit from the loop and is conditional. Often, the exit condition is complicated and requires its own IF structure. In practice when it comes to coding loops I often code the exit as the last instruction then only one jump instruction is required. The loop ends by falling out the bottom after the last iteration. Using the DJNZ instruction is an example of this. Figure 4 shows the diagram of the loop. Always write the condition as this is most important.

I always like to consider loops as illustrated in figure 5. They nearly always consist of three parts.

1. Initialising variables ready for the loop. Here registers are set up with their start values etc.
2. The code that is actually in the loop,
3. The processing after the loop has finished.

Putting the elements together

As an example of how to combine various elements, imagine that we want to program a 'droid to make us a cup of coffee. Figure 6 shows the structure of this activity. The box at the top describes the complete task:— MAKE COFFEE. If our 'droid has been told how to do this before, this is the only box we would need. The next level down on the diagram splits the task into three main sub-tasks. The next level down splits each sub-task further. Note that each horizontal level describes the complete task but each at a different level of detail.

We could go on splitting boxes as much as we need. I have assumed that our 'droid has the programming to carry out tasks on the lowest level. If the 'droid did not know how to do the lowest boxes he might well ask for a complete new diagram for each unknown task. It is better to draw a master structure and detail activities that need further splitting on separate sheets. As a rule of thumb a diagram should easily fit onto an A4 piece of paper with no more than eight horizontal rows. If you have a job fitting the structure onto the page you are trying to describe both detail and overview structure on the same diagram.

How to structure a program

It might seem a bit tricky at first, but it is well worth the trouble. What you find is that there are only a few kinds of program and the structures involved tend to be the same again and again!

Once you are sure what the program has to do then you can start to structure it. If a program is going to process only one or two files its structure will reflect the data structure, so it is best to sort this out first. For example, if the data is a list of numbers followed by a trailer to tell the program that the data has ended the structure will contain a LOOP UNTIL TRAILER followed by a DO TRAILER.

However, few games programs are based around a main file. It is more suitable to build a structure using the main processes that must be performed. Start by listing the main tasks. Now we must decide when each task is to be done. We have to decide what the main loops in the program will be and we can then draw the loops and hang the tasks on the structure at the right level.

Figure 7 shows the structure of Space Invaders. All shoot-em-ups have very similar structures. These are the steps to take to arrive at the structure.

1. Write down the main tasks.
Move base
Fire
Move invaders
Set up sheet
Keep score
Initialise waves at start
Three lives
New game when one over

2. Decide the main loops.
To do this think of a loop as a plural eg Games. These are listed in order of nesting. Note that each describes a more detailed aspect of the program. Getting the order right is vital.

Space Invaders consists of Games, each consists of three lives which may have several sheets — which have many screen updates.

3. Draw the diagram.
Start at the top box and write in it the program name. Now, using the loop list, tackle one horizontal level at a time and consider what has to be done before and after the loop.

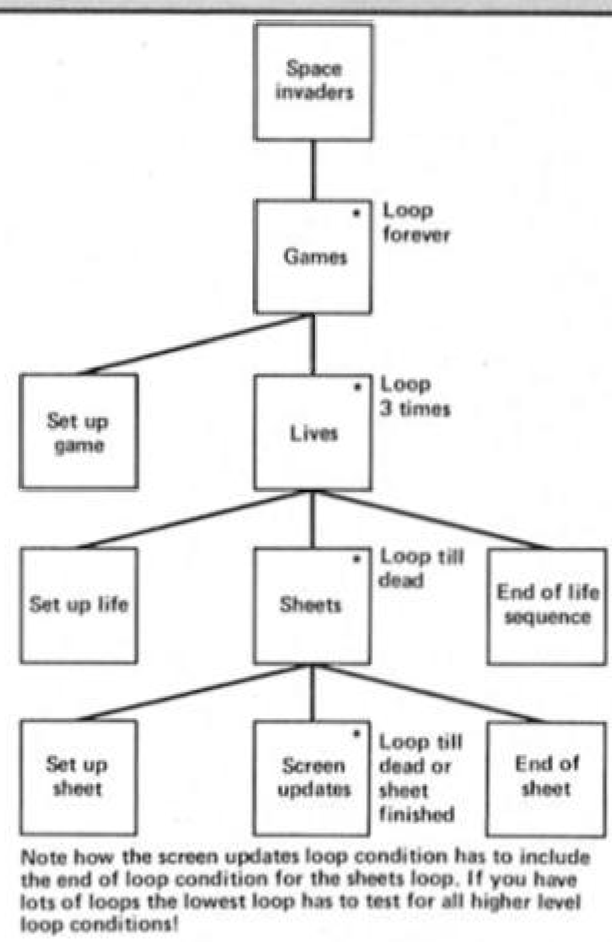
You may sometimes think of something that will not fit at any level on the structure. For example, after a certain number of bullets the bonus feature appears. If we considered this a large enough task we could add a new loop level between Sheets and Screen Updates. In this case though it is not a structural feature. The feature does not alter the running of the rest of the game so I would add it as an IF at the lowest level. Very often a level does need to be added and the drawing has to be re-drawn. Sometimes I have added levels when I am well into the coding stage. If your code follows your diagram it is easy to do this.

INPUT Routine

This month's example routine is a machine code version of the Basic INPUT statement. it is amazing how many commercial utilities do not provide full cursor delete and insert functions when they request data input! If you use this routine with last month's PRINT routine you should be able to construct machine code programs that INPUT and PRINT data.

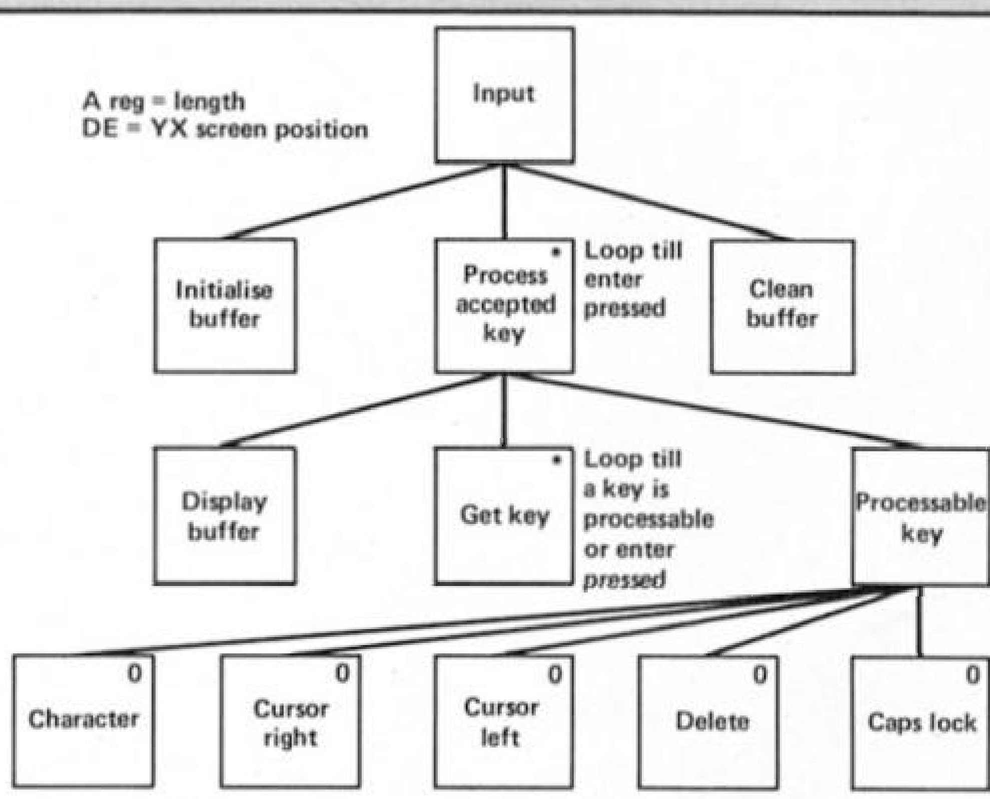
I have included a structure diagram at overview level for the routine. Try to find the structure boxes in the coding. I had to draw separate diagrams for some of the lowest boxes, and these were strongly dependent on the structure of the input buffer I chose to use. See if you can work out some of the detailed structures.

To use the routine first print a prompt message using last month's Print or Write routines. Then set the DE registers to the input position (D=y in pixels, E=x in characters). Then set up your required input length in the A register from 1 to 32 characers in length. Then simply call the routine. Note the input buffer is in the format to be printed by the PRINT routine. The first byte contains the length of the buffer.



Note how the screen updates loop condition has to include the end of loop condition for the sheets loop. If you have lots of loops the lowest loop has to test for all higher level loop conditions!

Figure 7. Space invaders



Note how 'enter' will cause both loops to be exited

Figure 8. Input routine

Listing 1

Machine code INPUT routine.

```
0000          00000
0000          00000          ORG  0C000H
C000          00000   ;EXAMPLE INPUTX USE
C000          00000
C000 110000   00000          LD   DE,0   ;SCREEN Y,X
C003 2124C0   00000          LD   HL,MESS1
C006 CD88C1   00000          CALL PRINT     ;PROMPT MESS
C009 111000   00000          LD   DE,0010H;  SCREEN YX
C00C 3E10     00000          LD   A,16      ;FIELD LENGH
C00E CD42C0   00000          CALL INPUTX
```

```
C011          00000
C011          00000   ;THE INPUT DATA IS NOW IN THE
C011          00000   ;BUFFER READY TO USE
C011          00000
C011 110010   00000          LD   DE,1000H  ;PRINT
C014 2134C0   00000          LD   HL,MESS2  ;MESSAGE
C017 CD88C1   00000          CALL PRINT
C01A 110E10   00000          LD   DE,100EH
C01D 214DC1   00005          LD   HL,LENGTH  ;PRINT
C020 CD88C1   00000          CALL PRINT      ;RESULT
```

```
C023 C9          00000           RET
C024             00000
C024             00000
C024 0F          00000  MESS1    DB   15
C025 454E5445    00000           DM   'ENTER YOUR NAME'
C029 5220594F
C02D 5552204E
C031 414D45
C034 0D          00000  MESS2    DB   13
C035 594F5552    00000           DM   'YOUR NAME IS '
C039 204E414D
C03D 45204953
C041 20
C042             00000
C042             00000  ;------------------------------
C042             00000
C042             00000  ;CALLED WITH
C042             00000  ;A REG= LENGTH OF INPUT 1-32
C042             00000  ;D=Y SCREEN POSITION PIXELS 0=TP
C042             00000  ;E=X SCREEN POSITION CHARACTERS
C042             00000  INPUTX
C042             00000  ;DO INITIALISE
C042 324DC1      00000  OK       LD   (LENGTH),A  ;SAVE
C045 6F          00000           LD   L,A         ;PASSED
C046 ED5375C1    00000           LD   (OUTPOS),DE ;DATA
C04A AF          00000           XOR  A
C04B 3273C1      00000           LD   (CURSOR),A
C04E 67          00000           LD   H,A
C04F 114EC1      00000           LD   DE,BUFFER
C052 19          00000           ADD  HL,DE
C053 2270C1      00000           LD   (BUFEND),HL
C056 3A4DC1      00000           LD   A,(LENGTH)
C059 47          00000           LD   B,A         ;INITIALISE
C05A 214EC1      00000           LD   HL,BUFFER   ;BUFFER
C05D 367F        00000           LD   (HL),CURS
C05F 23          00000           INC  HL
C060 3E2D        00000           LD   A,ULINE
C062 77          00000  CLEAR    LD   (HL),A
C063 23          00000           INC  HL
C064 10FC        00000           DJNZ CLEAR       ;SAY KEY
C066 213B5C      00000           LD   HL,FLAGS ;TAKEN
C069 CBAE        00000           RES  5,(HL)
C06B             00000
C06B             00000  ;DO PROCESS ACCEPTED KEY
C06B             00000  ;UNTIL ENTER PRESSED
C06B             00000
C06B             00000  ACCEPT
C06B ED5B75C1    00000           LD   DE,(OUTPOS)
C06F 214DC1      00000           LD   HL,LENGTH
C072 CD88C1      00000           CALL PRINT
C075             00000
C075             00000  ;DO GETKEY UNTIL KEY ACCEPTED
C075             00000
C075 213B5C      00000  GETKEY   LD   HL,FLAGS
C078 CB6E        00000           BIT  5,(HL)
C07A 28F9        00000           JR   Z,GETKEY
C07C 3A085C      00000           LD   A,(LASTK)  TAKE IT
C07F CBAE        00000           RES  5,(HL)
C081 FE06        00000           CP   6
C083 38F0        00000           JR   C,GETKEY
C085 FE0D        00000           CP   0DH
C087 CA2FC1      00000           JP   Z,ENTER
C08A FE08        00000           CP   8
C08C 283A        00000           JR   Z,CRLEFT
C08E FE09        00000           CP   9
C090 284F        00000           JR   Z,CRRIGT
C092 FE0C        00000           CP   0CH
C094 2869        00000           JR   Z,DELETE
C096 FE06        00000           CP   6
C098 CA25C1      00000           JP   Z,CAPSLK
C09B FE20        00000           CP   20H
C09D 38D6        00000           JR   C,GETKEY
C09F FE80        00000           CP   80H
C0A1 30D2        00000           JR   NC,GETKEY
C0A3             00000
C0A3             00000  ;IF VALID
C0A3             00000  ;IF CHARACTER
C0A3 3274C1      00000           LD   (LETTER),A ;TEMP STR
C0A6 3A73C1      00000           LD   A,(CURSOR)
C0A9 47          00000           LD   B,A
C0AA 3A4DC1      00000           LD   A,(LENGTH)
C0AD 90          00000           SUB  B
C0AE 28C5        00000           JR   Z,GETKEY   ;BUF FULL
C0B0 4F          00000           LD   C,A     ;=NO TO SHUNT
C0B1 78          00000           LD   A,B
C0B2 3C          00000           INC  A   ;NEW CURS DISPLMT
C0B3 3273C1      00000           LD   (CURSOR),A
C0B6             00000
C0B6 ED5B70C1    00000           LD   DE,(BUFEND)
C0BA 2A70C1      00000           LD   HL,(BUFEND)
C0BD 2B          00000           DEC  HL
C0BE 0600        00000           LD   B,0
C0C0 EDB8        00000           LDDR ;SHUNT RIGHT
C0C2 3A74C1      00000           LD   A,(LETTER)
C0C5 12          00000           LD   (DE),A
C0C6 18A3        00000           JR   ACCEPT
C0C8             00000
C0C8             00000  ;IF CURSOR LEFT
C125 216A5C      00000  CAPSLK   LD   HL,5C6AH
C128 3E08        00000           LD   A,8H
C12A AE          00000           XOR  (HL)
C12B 77          00000           LD   (HL),A
C12C C36BC0      00000           JP   ACCEPT
C12F             00000
C12F             00000  ;IF ENTER END GETKEY LOOP
C12F             00000  ;         END ACCEPTED KEY LOOP
C12F             00000  ENTER
C12F             00000  ;REMOVE CURSOR AND DASHES
C12F 114EC1      00000           LD   DE,BUFFER
C132 214EC1      00000           LD   HL,BUFFER
C135 3A4DC1      00000           LD   A,(LENGTH)
C138 47          00000           LD   B,A
C139 7E          00000  CLEAN    LD   A,(HL)  ;HL=SOURCE
C13A 23          00000           INC  HL      ;DE=DESTIN
C13B FE7F        00000           CP   CURS
C13D 2808        00000           JR   Z,IGNORE
C13F FE2D        00000           CP   ULINE
C141 2002        00000           JR   NZ,PACK
C143 3E20        00000           LD   A,SPACE
C145 12          00000  PACK     LD   (DE),A
C146 13          00000           INC  DE
C147 10F0        00000  IGNORE   DJNZ CLEAN
C149 3E20        00000           LD   A,SPACE
C14B 12          00000           LD   (DE),A
C14C C9          00000           RET
C14D             00000
C14D             00000
C14D             00000  ;PRINT BUFFER VARIABLE SETUP
C14D 00          00000  LENGTH   DB   0 ;USED TO SIZE BUFR
C14E             00000  BUFFER   DS   34  ;RESERVE 34 BTS
C170             00000
C170 0000        00000  BUFEND   DW   0  ;ADDRESS OF END+1
002D             00000  ULINE    EQU  '-' ;FIELD UNDERLINE
007F             00000  CURS     EQU  127 ;CURSOR
0020             00000  SPACE    EQU  ' '
C172             00000  ;PRINT SPACE VARIABLE SETUP
5C3B             00000  FLAGS    EQU  5C3BH
5C6A             00000  FLAGS2   EQU  5C6AH
5C08             00000  LASTK    EQU  23560 ;SINCLAIR KEYP
C172 00          00000  COUNT    DB   0  ;LOOP COUNTER
C173 00          00000  CURSOR   DB   0;CURSOR DISPLACEMNT
C174 00          00000  LETTER   DB   0;STORED KEYPRESS
C175 0000        00000  OUTPOS   DW   0;SCREEN YX
C177             00000
C0C8 3A73C1      00000  CRLEFT   LD   A,(CURSOR)
C0CB A7          00000           AND  A
C0CC 28A7        00000           JR   Z,GETKEY
C0CE 3D          00000           DEC  A
C0CF 3273C1      00000           LD   (CURSOR),A
C0D2 214EC1      00000           LD   HL,BUFFER
C0D5 5F          00000           LD   E,A
C0D6 1600        00000           LD   D,0
C0D8 19          00000           ADD  HL,DE
C0D9 7E          00000           LD   A,(HL)     ;SWAP
C0DA 367F        00000           LD   (HL),CURS ;PLACES
C0DC 23          00000           INC  HL
C0DD 77          00000           LD   (HL),A
C0DE C36BC0      00000           JP   ACCEPT
C0E1             00000  ;IF CURSOR RIGHT
C0E1             00000  CRRIGT
C0E1 3A4DC1      00000           LD   A,(LENGTH)
C0E4 4F          00000           LD   C,A
C0E5 3A73C1      00000           LD   A,(CURSOR)
C0E8 B9          00000           CP   C
C0E9 CA75C0      00000           JP   Z,GETKEY
C0EC 3C          00000           INC  A
C0ED 3273C1      00000           LD   (CURSOR),A
C0F0 214EC1      00000           LD   HL,BUFFER
C0F3 5F          00000           LD   E,A
C0F4 1600        00000           LD   D,0
C0F6 19          00000           ADD  HL,DE
C0F7 7E          00000           LD   A,(HL)       ;SWAP
C0F8 367F        00000           LD   (HL),CURS   ;PLACES
C0FA 2B          00000           DEC  HL
C0FB 77          00000           LD   (HL),A
C0FC C36BC0      00000           JP   ACCEPT
C0FF             00000  ;IF DELETE
C0FF             00000  DELETE
C0FF 3A73C1      00000           LD   A,(CURSOR)
C102 A7          00000           AND  A
C103 CA75C0      00000           JP   Z,GETKEY   ;ALL GONE
C106 5F          00000           LD   E,A
C107 3A4DC1      00000           LD   A,(LENGTH)
C10A 93          00000           SUB  E
C10B 3C          00000           INC  A
C10C 4F          00000           LD   C,A;=NO TO SHUNT
C10D 7B          00000           LD   A,E
C10E 3D          00000           DEC  A   ;NEW CURS DISPLMT
C10F 3273C1      00000           LD   (CURSOR),A
C112             00000
C112 214EC1      00000           LD   HL,BUFFER
C115 1600        00000           LD   D,0
C117 19          00000           ADD  HL,DE
C118 54          00000           LD   D,H
C119 5D          00000           LD   E,L
C11A 1B          00000           DEC  DE
C11B 0600        00000           LD   B,0
C11D EDB0        00000           LDIR ;BC=SHUNT RIGHT NO
C11F 3E2D        00000           LD   A,ULINE ;BLANK CHARL
C121 12          00000           LD   (DE),A ;AFTER BUFFER
C122 C36BC0      00000           JP   ACCEPT
C125             00000
C125             00000  ;IF CAPS LOCK
```

TASWORD IN THE ROUND

John Wase examines the Tasword Three Opus disc conversion

Back in April (the first ZX Computer Monthly, p.19) Carol Brooksbank reviewed the new Tasword Three. Following the excellent review, I eagerly awaited the disc version. Tasman stated at the time, "Tasword Three is supplied on, and will only run on microdrives."

Discovery is not compatible with microdrives and Tasword Three has only a short basic loader; conversion was beyond my capabilities. However, Tasman assured me that an Opus version was on the way and eventually it has arrived.

New features

Just to recap on Carol's review, Tasword Three includes virtually everything Tasword Two omits: plenty of printer options, lots of control codes, fast cursor movement with every conceivable variant, multiple copies, headers, footers, pagination, printing sequential files (for large documents).

So what's new about the Opus version? Firstly there's the added reliability. Secondly, as was mentioned, every time STOP is pressed for the main menu, this is pulled from the disc. I did some timings on this: as near as I could get it, it took 7.8 seconds — just acceptable. I suspect microdrives took longer.

Thirdly, there are some essential differences to the program. When the disc is catalogued, the catalogue fills the top half of the screen in three columns, and then asks for a scroll if there are still more files: this permits the extra disc capacity to be used. And, of course, the number of permissible drives is cut to two. Finally, a label in the front of the manual gives information on using the Opus centronics port (I would have preferred hash to pound) and, naively, tells you to read disc for microdrive (what about cartridge?).

Bugs fixed

In the original microdrive version, there were a few bugs. The first few copies omitted the loading address for the Tasword Two/Tasword Three file conversion program; more obscurely, there were one or two copies where font changing in Tasprint was difficult, where the last print line from a Masterfile merge was too low, or with a few minor problems in Mailmerge. These have all been fixed in the disc version, which is essentially bug-free, as far as I could find.

```
                        CURSOR MOVEMENT
3↑ start of text    THEN scroll up         3½  start of paragraph
3↓ end of text      TO scroll down         3(  end of paragraph
3← start of line    36 fast scroll up      3&  next page
3→ end of line      3F fast scroll down    3'  start of page
3Q word left        3E word right          3*  start of screen
3 =EXTEND  TRUE VID =UP HELP  INV VID =DOWN HELP  31 =HELP OFF
■            T A S W O R D   T H R E E   T U T O R
                   (C) 1986 Tasman Software Ltd

This Tasword Three Tutor is a text file that has  been  designed
to help you use the Tasword control keys.

A useful key which saves you referring to the manual  too  often
is EDIT. A help page is dispayed on  the  screen  when  EDIT  is
pressed. Press ENTER when the help page is showing to return  to
the text. Try EDIT now.

When the help page is showing you can press EDIT again  to  view
another part of the help page. Try it.

Now press the TO key (symbol shift F) and keep pressing TO until
|LINE    1|COL   1|R/J ON |W/W ON |INSERT OFF|PG/BK OFF|EDIT=HELP|
```

Impressions

My initial impression was one of complexity. One of the big advantages of Tasword Two was its simplicity, and in comparison, Tasword Three looked formidable. However, it didn't take long to get used to it; the tutor is so good and the instruction book so comprehensive that most of the features are readily explained. My first task was to print 50 copies of a letter, and although I used the form-feed option, it wouldn't! (This is because there are so many options; the one I chose applied to page breaks, but not to the end of text). I couldn't find the "force form feed option, either — I was looking at the wrong page of the manual. So all in all, I started up by fouling it up pretty well. Nevertheless, I got it to work within 20 minutes and printed out my fifty letters.

Replaces

When I got a note from our Ed. about this page, I thought I'd better check all the goodies. Tasword Two's "Search and Replace" was glacier-like, so I tried Tasword Three's version with the following (I must have got Ed. on the brain):

Ed is a little boy, just like ed, Ed's dad; uncle ed; cousin Ed and ed. They are like ed: like ed's dad, Ed, ed is a suitable sort of word to edit.

It happily and rapidly replaced Ed ed Ed, ed. ed: ed; with Edward, but ignored Ed's or ed's or Edit (that is it allowed for most punctuation marks). Pretty good.

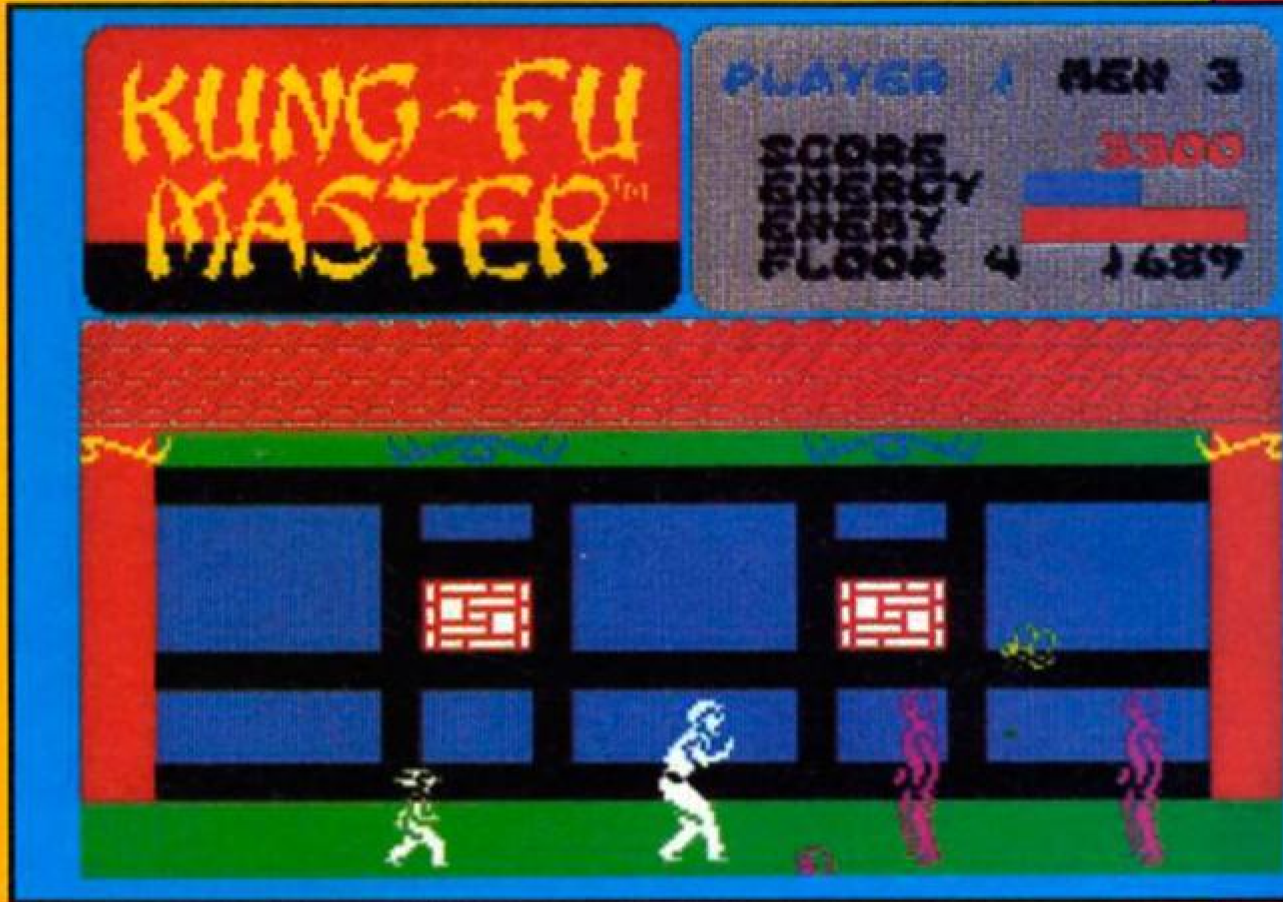
T2/T3

Finally, the Tasword Two to Tasword Three conversion program. The instruction manual (p.63) asks you to ensure that your Tasword Two text files are in drive 1. Mine are all on five and a quarter discs in drive 2, and not interchangeable. Fortunately, it's relatively easy to edit lines 110 and 180 of this program to drive 2, and that solves the problem.

Bits and pieces

There are still a few irritating features. Control codes (even including spaces) can still spoil justification. Fortunately, there is a version of "Taspro" for Tasword Three giving equal justification and overcoming this problem. The Tab feature is left justified only. You can't save sections of a file, (although deleting is much easier than with Tasword Two). These, however, are small gripes: all in all it's a superb program, excellently documented and easy to use. I'm a convert already — pass me T2T3!

Kung Fu Master
US Gold
£9.95



KUNG ~FU MASTER

US Gold are a bit late in jumping onto the martial arts bandwagon, but presumably they hope to make up for this by coming out with the 'official' conversion of the coin-op hit Kung Fu Master. If you ever go into a coin-op arcade you'll probably have seen the original version of this game, which was one of the earliest kung-fu type games to emerge from the arcades. Apart from the novelty of the game, the quality of the graphics and the fast action were the main factors behind the game's popularity. Predictably, these things aren't quite as successful on the Spectrum as on the original, but the game still has a certain amount going for it.

The game puts you on the ground floor of a wizard's temple inside which the inscrutable fiend has imprisoned your favourite geisha. Starting at the bottom (of the temple, not the geisha) you have to work your way up to the fifth floor, battling your way past the wizard's henchmen, and other creatures conjured up by his magical powers. To help you on your way you have only three lives and your martial arts skills to rely upon.

Each floor of the temple is shown as a scrolling background, and the stairs to each succesive floor can be reached by fighting your way towards the left hand side of the screen. As you do so, the temple



guardians and henchmen will pour onto the screen from either side so you have to be pretty quick to spin around and tackle both lots of attackers.

The different attackers can be identified by their colouring; the purple ones are relatively harmless and can be despatched with a single blow, but the light blue guys are trickier — they can feint as they approach, and hurl daggers at different heights which you'll have to duck under or jump over. The impact of a knife or any blow from an attacker drains your energy level and once that reaches zero you've snuffed it and will have to start from the beginning with a new life. I found this a bit irritating, and it might have been better if you were allowed to continue each new life from the point where you died. As it is I sometimes got a bit bored of repeatedly having to go through the early stages on each floor whenever I died.

The graphics are a bit rough in places I'm afraid. The figures of the various chacters are well enough designed and animated, but there are some bad attribute clashes when different coloured figures approach each other, and occasionally when you leap past certain background details.

The action is also slower than in the original, at least in the early stages, and your attackers aren't as 'versatile' as they are in some other kung fu games — they seem to attack by just walking up to you and draining energy, whereas in other games the attackers often have their own repertoire of fancy moves.

You can draw on the usual variety of punches and kicks, giving you a total of twelve different movements, though you can't do fancy things like somersaulting over opponents. Although you don't have quite the speed and number of moves that other games offer, I found this an advantage in some ways. I'm normally overwhelmed by the speed and complexity of most kung-fu games, but I found it easier to get to grips with Kung Fu Master than say, Way of The Exploding Fist.

So, US Gold might be a bit late with this game, and hardened ninja-bashers might not have too much trouble punching their way through the temple, but if you're still a bit of a novice then Kung Fu Master could be a good place to start training while we all wait for Fist II.




GODFREY DOWSON

LEVEL 9 COUNTRY

Level 9 are celebrating five years in business but with a multifarious range of projects in the making there is no time to put on the party hats as ZX found when we visited L9's west country retreat.

The Level 9 Partners: From left to right Pete, Nick and Mike Austin



Down in the valley below, miniature cows chew the cud, daydreaming perhaps that they will inspire the programmers in the house at the top of the hill to star them in Friesian Adventure.

So far, the Level 9 programmers who moved into 'Rocklease', a few miles outside Weston Super Mare, 18 months ago, have resisted the ever present bovine influence on their writing — but if it ever happens you'll know why.

Rocklease, an impressive house built into the rock of the hillside and giving panoramic views for miles around is a far cry from L9's previous programming base in High Wycombe, but, surprisingly, all this rustic tranquillity has not caused distractions from the keyboard.

"The real advantage," says Peter Austin, "is that we get far more work done because we're away from the phone." But there is the odd bit of excitement? "Oh yes," said Peter, "occasionally a horse goes by."

The Archers

One of Level 9's current projects has a definite rural theme. In conjunction with Mosaic, L9 are writing a computer game based on the long running radio series, The Archers.

"We wanted to do a soap opera and thought that the Archers would have an extra intellectual appeal, as some soap operas no one will admit to watching.

"In the game you take the part of the scriptwriter who has to decide how the characters will live their lives and how this will effect the audience ratings. If you make a bad decision and lose half a million listeners you get an angry memo from the Controller of Radio 4. All the background was supplied by the scriptwriters and it's just a case of writing the game based on that."

Games like the Archers make an interesting diversion from writing the adventures that have become Level 9's forte, but Level 9's first products as a company were actually utilities and arcade games for the Nascom.

The company evolved from a family hobby with Peter, Michael and Nicholas Austin all programming in their spare time, but it quickly developed into a family business requiring a full time commitment. Margaret Austin runs the marketing side of Level 9 from Reading and Mr Austin senior looks after the accounts.

Now the workload has increased due to the licensing deal with Rainbird, aimed at pushing Level 9 games in the American market and additional programmers and artists have been brought in.

It was a couple of years before Level 9 released their first adventure. "Like an awful lot of people I'd played Colossal on a mainframe and the challenge for me was to take it and try to cram in onto a home micro," said Peter. Michael added, "After that was a success we tried doing other adventures and decided to stick in that field."

From Colossal Adventure came Adventure Quest and the trilogy was completed by Dungeon Adventure. What became known as the Middle Earth Trilogy has been revisited by Level 9 and been enhanced. The result is Jewels of Darkness, a £14.94 package containing the three adventures on three cassettes plus a booklet, Darkness Rising by Peter McBride which acts as a scene setter for the adventures.

Jewels of Darkness is the first Level 9 product to be packaged and marketed by Rainbird and brings the pure text adventures up to date by including graphics, a new parser, and advanced features introduced in the recent Price of Magic. The vocabulary in each adventure has been increased to 1000 words and all told the trilogy contains over 600 pictures.

On the Spectrum each adventure will be in two versions with a choice of a text-only version on one side and text with graphics on the other. This, said Peter, was to head off the ongoing debate between the purist text adventurers and those in the graphic adventure camp.

"It's a business fact that if we leave out the graphics we will

halve our sales, but of course if we put the pics in and take out the text we get complaints so if we give them the choice they can just pick which version they prefer."

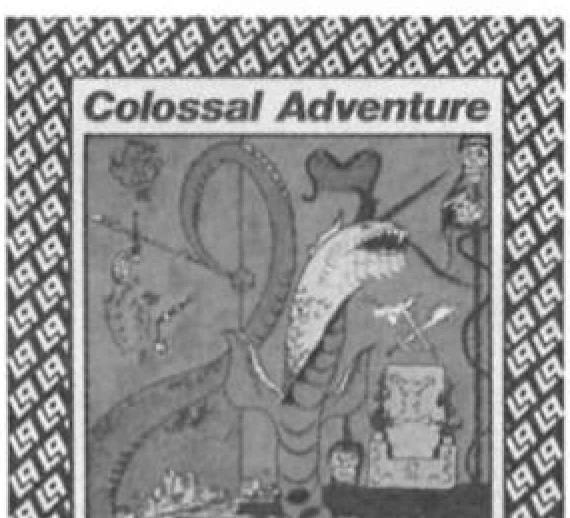
Another feature is that the trilogy can now be played as a complete adventure.

"If you get a maximum score at the end of one part you can save your position, but of course finishing all three will be quite tricky."

Help!

A help system has been added with seven or eight help messages towards the beginning of the adventures. But some help messages are more helpful than others, "Beware of some really bad puns," warned Peter, who said the tips had been included to get new adventurers off to a smooth start.

New commands have been added to save time. You can now "take all" or "drop all



except" — which prevents the laborious listing of objects.

Also added is the death defying "Oops" command introduced in the Price of Magik. If you get killed you can back to your former position and on the 128 version of the trilogy it will be possible to resurrect yourself 20 or 30 positions earlier in the game.

The enhanced trilogy runs a lot faster than the original and will also accept multiple commands up to 80 characters in length. The Middle Earth Trilogy is one of the best known and most played adventure series but Michael believes that it will appeal to those who missed it first time round.

"I suppose if you had played two parts it might be difficult to justify buying it for the third but if you hadn't played an adventure before or you came relatively late to the Spectrum I think it will be of great interest."

Whenever a genre becomes established there is only a short time lag before the spoofs appear and Level 9 who did so much to establish adventures have an adventure parody called Knight Orc in preparation for release in November.

"Knight Orc is a three part multi-load adventure with each part being linked together to form one continuous game. It's a complex scenario with a couple of twists. You plan an Orc who is constantly pursued by human adventurers and you team up with other poor creatures who have been beaten up by the humans. It's meant to be a dig at adventure playing."

Did bringing out a spoof mean that Level 9 felt adventure writing had gone as far as it could go?

"No, I think spoofs appear when there is enough history to base it on and I think there are more areas to develop in adventures. I don't think we are anywhere near what is possible. Even with the 48K Spectrum there are things like multiload, multitasking, more text and greater characterisation that can be done."

To the non adventurer the appeal of adventures can seem unfathomable so why do people enjoy them?

"There is an appeal to the hack and slay instinct," said Michael, "and that was what we tried to emphasise in the Price of Magik where the hack and slay method got you absolutely nowhere."

"I think the appeal is that adventures are good, all round entertainment," added Peter. "We try to provide interesting settings, scenery, puzzles and a substantial slice of humour in each game."

Plans are underway to start a Level 9 Multi User game called Avalon. At present the Austins are still toying with which hardware system to use but say that the system should be operational around Christmas.

"The number of players is theoretically infinite — you just add more processors. But realistically we hope to start with about 30 and work up to a hundred or so, but if it proves



popular we will support as many people who want to use it."

Multi user games are a natural progression from Adventure playing said Michael, "When most people play adventures it's a solitary thing — there's no club spirit. A multi user game is really an extension of a chatline with extras thrown in."

New adventures will continue to appear from the hilltop HQ at Rocklease and old favourites will emerge in new, updated, forms.

"We don't view games as something we bring out and forget, we like to think that they will be around in some form in ten years time."



THE LIFE AND TIMES OF LEVEL 9

Peter Sweasey looks back at the adventures that made Level 9's name.

Level 9's first adventure was what is generally reckoned to be the world's first, though not their version. **Colossal Adventure** is based on the Crowther/Woods mainframe game, and contains all the traditional puzzles like the troll, giant, twisty passages and knife-throwing dwarves. Level 9's version stands out from the other rip-offs because it actually improves upon the original. It adds some description to normally brief text, and includes a new, seventy location endgame. While this doesn't really blend with the rest, it is certainly entertaining and raises this version above the others.

Middle Earth Trilogy

The company made Colossal the first of a trilogy set in Tolkien's magical Middle Earth. The second game, **Adventure Quest,** takes place many centuries later. Life in Middle Earth is peaceful until the Demon Lord Agaliarept terrifies everyone with drought, attacks by savage beasts, and (yawn) orc armies.



The Wizard's Guild is called upon when the armies fail. The High Council intends a combined attack — but they send you, a mere apprentice, on a solo contingency mission to collect the four Stones-Of-The-Elements and enter the Demon Lord's tower for single conflict.

Surprisingly this uninspired plot leads to a unique adventure. You start near the small, brick building of the original, and travel through familiar locations until you reach the entrance to the colossal cave network — which has been sealed with concrete, a nice touch. Otherwise the terrain is unusual: over forest, desert and mountain you encounter some extremely entertaining problems, with elements of Dune and the Thomas Covenant books. A genuine quest atmosphere is created, making this a personal favourite.

Dungeon Adventure completes the trilogy. You play a fortune-hunter who, on hearing of the Demon Lord's defeat, sets off for the treasure-filled dungeons under the Black Tower. It's back into the caves again for a massive, very traditional game with over a hundred puzzles. It's difficult, a superb example of its genre, but one for the purist.

Time Lords

Lords of Time is a rarity for Level 9 as it's written by a non-Austin, Sue Gazzard. Father Time has chosen you to defend history against nine evil Timelords. You travel through nine timezones in a grandfather clock (makes a change from a police box). Not an amazingly original idea, but one of their most popular early games. The problems are fun and intelligent, and require deep thought on how to use seemingly everyday objects. EXAMINE makes its first appearance in a L9 game, to good effect; and there's a pleasant, slightly humourous streak. Still a worthy buy.

Silicon Dreams

You awake from deep-freeze storage to find your long-distance human transport ship



hurtling towards a star and certain death. Can you, Kim Kimberly, stop it? Science fiction time, in **Snowball,** the first of the Silicon Dream trilogy. As you can see, Level 9 have never been particulary strong on originality, it's the brilliant execution which has made their name. Snowball boasts seven thousand locations — many repeated — and is, in my opinion, easily their poorest product, not least because of the monotonous, and thus boring, scenery. Description is for them poor — again, I suspect, due to the vast size of the game. But I must admit that I never persevered particularly with the game and dislike hard core science fiction; some people loved this. Horses for courses.

From Snowball onwards L9 games were significantly different. I should point out that the five adventures outlined above aren't the polished gems that gain rave reviews these days (although they did in their time, and deservedly so). Whilst basically marvellous they have dated a little. Their presentation is quite basic (black on white), and the input routine does not allow for speedy typists (except, strangely, in my copy of Quest, which seems to have been updated). Vocabularies, whilst again incredible at the time, are sometimes only average by today's standards, and the earliest lack an EXAMINE

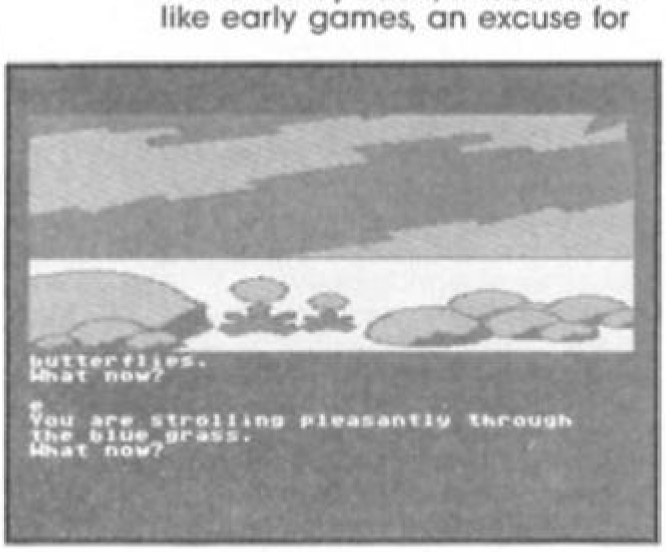
command. The text is not always of their nowadays accepted quality.

With **Return To Eden,** the second of the Silicon trilogy, Level 9 improved the presentation and added graphics. Text reached the current superior standard, a near-perfect combination of descriptive and informative writing. Whilst not usually good enough for a professional novel, it's certainly some of the Spectrum's best.

Return To Eden is a wonderful game. The saved crew of the Snowball think you were responsible for the sabotage that almost killed them, and you escape in a stratoglider from certain execution. You land on the planet of Eden, already colonised by robots who have built a city for human settlers. But you land far away from that civilisation, amongst the strange, hostile, native wildlife. You first have to battle through the alien jungle, then try to survive in the robot controlled city. This game is at times exceedingly devious — it'll take you ages to even escape the jungle — but it's absorbing, frustrating and immensely enjoyable, all in one!

Of Islands and Moons

Emerald Isle and **Red Moon** were the next two releases. They cost three pounds less than usual because they were programmed faster and are supposedly easier. The former passed virtually unnoticed while the latter was heaped with acclaim which was not entirely deserved. Certainly it doesn't have the interlocking complexity achieved by Eden; it feels more like early games, an excuse for



From Red Moon

a collection of puzzles. Though of course some people like it that way.

The moon was once red and the source of magik. But its colour faded and so did the sorcerors' potency, until eventually they constructed a Red Moon Crystal, which magnified the moon's force enough to enable continued conjuring. But, someone has stolen the crystal, and guess who has to retrieve it?

Red Moon featured two innovations for L9. Many spells can be cast and combat routines are included, with a decreasing stamina count. Otherwise it's familiar middle earth territory (the reason for its extraordinary popularity perhaps), with the major settings being a castle and a cave network. The puzzles aren't astounding, the parser isn't particularly sophisticated and the appearance of objects from Colossal Adventure added to the sense of déja vu I felt in playing. But even an average Level 9 game is excellent by other people's standards.

Worm In Paradise more than made up for any disappointment with the cheaper games. Back to Eden, a century later, where you are a citizen of the Enoch metropolis. Robots do all the important and menial jobs: in fact they run the city. Eden seems like paradise for the silent majority.

Worm saw the introduction of the new adventure system. It features an incredible 1000+ word vocabulary which understands nearly all the words of the location text. Complex sentences previously confined to disc adventures are interpreted. The range of responses is magnificent. Advanced features such as 'type-ahead' (while text is appearing) add polish.

But Worm is also a superbly designed game. Although dealing (superbly) with the hackneyed future theme, there's the added dimension of sharp, sometimes subtle, political comment. Eden is a combination of extremist Thatcherism with Stalinist hero worship and communist conformity. The Health service makes a profit by reselling body parts to ageing recipients; the police force fines, rather than imprisons, to be more cost effective. You can ignore all this of course, and just solve the masterly problems, but Worm In Paradise is a game of unparalleled intelligence on the British market.

The Price of Magik

Insanity is the **Price Of Magik;** as you become a more skilful wizard you go crazier.

For me, POM shows that British adventuring has come of age. You genuinely feel you are exploring a fantastic place, helped by the incredibly



intelligent parser. Proof of this comes from two phrases I typed which no other game would respond to. EXAMINE ME brings (quite correctly) "A fine specimen of humanity". Whilst at another point I was told I couldn't do something. WHY? I typed. "Why not?" responded the game! Commands like RAMSAVE and OOPS further enhance the experience.

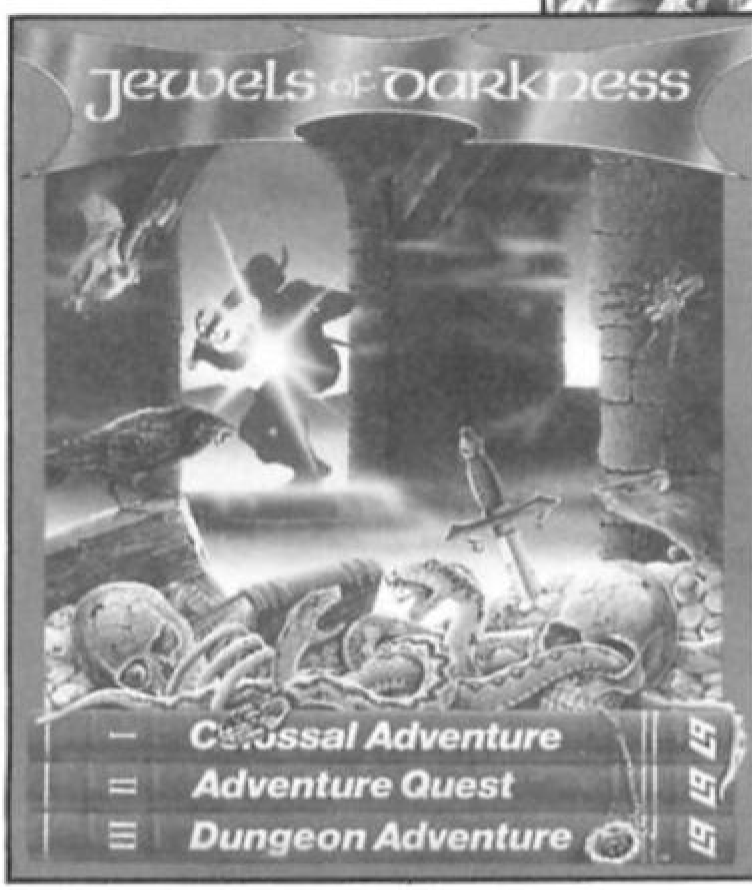
One aspect of L9 games remains unmentioned. The graphics. The company believes in lengthy text, but, presumably to enable sales in chain stores, started to add pictures — at every location too. The problem is that on the Spectrum they are absolutely dreadful. Eden features small, hi-resolution pictures. These are often repetitive and unclear, but seeing as it's an alien world they seem acceptable. By Red Moon, these deteriorated into blotchy, low resolution scribblings with random splashes of colour and little attention to the Spectrum's attribute problems causing gory, spotty, unrecognisable objects. POM showed a slight improvement. But what the company should do is have fewer but better pictures (perhaps in monochrome). Fortunately, with the two recent releases a non-graphics version with greatly extended text has been included on the B-side. Presentation in L9 games could also be improved — perhaps with use of colour.

So they're not perfect — yet — but they're getting close! All their games draw you instantly into a fantastic world, and you won't want to leave until its mysteries are solved. Nobody writes better adventures for your Spectrum.

Precious GEMS



To celebrate Level 9's fifth birthday we've got together with Rainbird to present 10 copies of Jewels of Darkness as prizes in our spot the similarity competition.



COMPETITION

You've heard all about spot the difference competitions well this is something different — a spot the similarity contest to test your knowledge of Level Nine game covers.

Look carefully at our front cover this month by Godfrey Dowson and you'll find images that have featured on previous Level Nine covers. The question is how many images can you identify and what games do they come from?

Simply write down the names of the Level 9 games you think the imagery is taken from on the coupon and send it to Jewels of Darkness Competition, ZX Computing Monthly, No 1 Golden Square, London W1R 3AB. The closing date is October the third. Please write the names of the games on the outside of the evenlope.

Ten lucky winners who spot the imagery will receive a copy of Jewels of Darkness, formerly known as the Middle Earth Trilogy but now revamped with graphics and many other improvements. The trilogy was one of the first adventure cycles and you have the chance to win a classic that, in its new form, is comparable with the latest adventure releases.

The competition is open to all ZX readers except employees of Argus Specialist Publications, Alabaster Passmore and Rainbird. The editor's decision is final and no correspondence can be entered into.

Jewels of Darkness Competition

The names of the games whose cover art images feature in the cover picture are..........

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Name ....

Address ....

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Send your entry to **Jewels of Darkness Competition,** ZX Computing Monthly, 1 Golden Square, London W1R 3AB. Please write the names of the games on the outside of your envelope. The closing date is October 3rd.

George Duvall slips on his goggles and takes to the sky with ACE

ACE
Cascade Games
£9.95



If I had to make one criticism of all the flight simulators currently available for the Spectrum, it would be that they're far too difficult to get involved with. Having loaded the games, you are expected to have read the 100+ page book, and be fluent with the multiple keystrokes to control the plane. Then, having done all this, you just fly around looking at the scenery!

ACE is something completely different. Although classed as a flight simulator, Cascade have turned ACE into a completely new flying experience. No longer are your wings clipped by lack of knowledge; once you're up, you are free to do whatever you want — and that includes blasting everything that moves!!

Set in England during, we presume, wartime, the southern shores are being invaded. Dozens of tanks have already landed, covered by SAM (Surface to Air Missiles) equipped helicopters, with numerous squadrons of enemy fighters patrolling the air. In a last valiant attempt to same England from these dastardly marauders, you have been assigned to fly the last three A.C.E. Mark 2.1 Multi-Role All Weather All Terrain (AWAT) combat aircraft. To make matters much worse, there are only three allied airbases remaining! Flying sorties from these bases, you must attack and destroy the enemy — irrespective of the fact that you are massively outnumbered.

Only when all the enemy land-bases, together with the fighters, have been successfully destroyed will you be able to embark on the final stage of the conflict: to sink the enemy fleet as they attempt to evacuate their defeated and demoralised army — this may sound totally callous, "but a man's gotta do what a man's gotta do"!!!!

All this may sound daunting, but there is one more problem that must be dealt with immediately, LENSLOK! In case you have never encountered this annoying piece of copy-protection, it involves a small plastic object which, when used in conjunction with specially written software, allows the software house to be reasonably sure that no-one can copy the game.

When the game is loaded, what looks like a load of junk — and many would argue IS a load of junk — appears on the screen. When you use the provided lens, this is supposed to turn into two letters, which upon entering lets you into the game. In theory this is all very well. In practice however, this just isn't the case. If you make three mistakes, or take too much time, the game crashes and you must reload. Thankfully, ACE has a practice mode, but lenslok is still a real pain, and many people will find that is stops them enjoying games such as ACE.



Once you have managed to get past lenslok — it took me nearly an hour the first time — you start playing in earnest. The first menu gives you a wide variety of playing options, which include; choosing your skill level, selecting single or crewed flight, settings for the game (Summer, Winer and Night), and Load and Display the high scores. Next you are given a choice of weapons to take on your mission. You have a choice of Multirole, Air superiority, Ground attack, or naval attack.

This might sound like a confusing set of decisions, but once you are used to playing the game it becomes just a matter of a few seconds between deciding what type of game you want to play, and taking off.

Getting airborne requires a matter of five minutes practice to master. First you must increase thrust by pressing Z, until the aircraft speed reaches about 150 knots. You can then pull the nose back and reach for the sky — remembering to pull up the undercarriage! Once in the air, and out of runway mode, you are free to start getting used to the controls and on-screen instrument panels.

One of ACE's best features is the excellent reaction to input. Loop the loop, rolls, and dummy stalls are all easily executed, with a minimum of worry — unless an enemy decides to interrupt your fun! After a short while, most people will be confident enough to take on the wrath of the enemy.

An essential part of ACE is using the map provided. Pressing M both gives you a detailed map of refuelling planes, any enemy, and the coastline. Without this you can be sure of one thing, you won't succeed. Having located the first batch of enemy tanks you must attack as soon as possible, giving yourself a little lead time on the enemy. Air to Ground missiles, or accurate cannon fire is generally adequate to rid you of most land-based baddies, although extended low altitude flight is not something to be recommended. If you are successful at destroying the tanks and helicopters, you must dive upward, and use all your flying prowess to dodge, swerve and generally avoid the other aircraft, shooting as you go.

Although there are refuelling planes, it is sometimes advisable to make a quick landing, when the plane will not only be refuelled, but any damage will be repaired.

Graphically, ACE is excellent. The feel of flying is created using a very effective 'horizon', and all the planes, tanks, trees, and helicopters are very well defined. More than anything else, ACE has a feeling of quality that makes it a joy to play. As far as anyone can make the most of the Spectrum's less than wonderful sound, ACE has a respectable amount of blasting sounds.

For fans of flight simulators who want something with a bit more zip, or arcade fanatics who feel they need a more long-lasting game, ACE represents an all-time bargain. Not only is it immensely playable, but it is deceptively difficult to finish.

Spectrum owners with a yearning to take off the best blast/simulation available yet, will find ACE satisfies them completely. In my view it is one of the most impressive games available at the moment, and I can recommend it whole heartedly.

MINDPLAY



Slime slips slowly down the stonework and the dungeon's chill penetrates further into my bones. Will I ever be released from slavery to barbaric Bryan? More work than ever this month, with seemingly millions of your missives and some software too.

"Surely this is my deranged imagination?" I thought as I saw the title on a couple of the cassettes. Too many glasses of stagnant rainwater — or insanity induced by the endless dripping of cold, lumpy custard? But no — Ocean's Hunchback The Adventure is here! The release date of "Early January" has finally arrived in Manchester, six months later than in the rest of the country (maybe Ocean have extremely long Christmas parties). It's a twin cassette pack, another reason for the delay perhaps?

Anyway to celebrate this long awaited event we've prodded our designer troll into action and turned Hunchback into our centre spread this month. Go away and read it, then come back for Helpline and all our other reviews (you will come back-won't you?).

I must mention a superb game which I'm sure will be reviewed elsewhere in the magazine, Mastertronic's Knight Tyme. Personally, I would class it as an adventure proper; although you can use a joystick, there are no arcade skills and it has more text than you'd find in an average Scott Adams. It's well worth the three pound price and it gets a Monster Hit rating from me: great fun. Another excellent budget adventure will be reviewed next issue — it's a Hobbit spoof written by John Wilson, an incredibly accomplished gamer who contributes a lot to the helpline. He's learnt a lot from all the games he's played and come up with a very competent program. Full details next month.

Adventure probe

I've had news of another adventure organisation. Adventure Probe publishes two magazines. The first, with the same name, is fairly standard club fare — reviews (of old and new games), hints, solutions (in serialised form!), and articles. It seems a bit pricey at £1 for a fairly thin issue: but this is early days and the magazine has admirable aims. The organisation also runs an adventure exchange organisation similar to the one I described last month, a useful idea as I said then. But the most unusual service is the magazine Adventure Contact, which is for budding adventure authors.

It contains hints on using utilities and articles on all aspects of adventure writing. Although one could argue that the people behind it aren't exactly qualified to give such advice, it is mostly very sound. The magazine could do with articles by professional adventure authors but I'd certainly recommend it if you're thiking of writing your first adventure.

All the organisation's output is from a computer printer so it's a bit basic. It offers some interesting services and Pam Winstanley and Sandra Sharkey seem committed to building it into a good club. For further information write to: Adventure Probe, 13 Hollington Way, Wigan WN3 6LS.

STARCRASH

Starcrash Software Systems
£4.95

The spaceship Lady Angela crashes unexpectedly; you, the sole crew member, regain consciousness in a mangled wreck; and you're surrounded by hostile alien jungle. This is a "survival simulation" as much as an adventure — and the going is tough.

Starcrash is two sides of text only Quilled adventure; which means a lot of text. The author has attempted an "interactive novel" and come close to succeeding. Each location has rich, long description, well written with much metaphor and alliteration. A nightmarish atmosphere is created. The problems are mostly realistic, challenging and fun (except for an illogical one with a ladder). Enjoyment is increased by the SEARCH command which often reveals new objects and is complemented by a reasonable EXAMINE. Otherwise basic presentation is improved by a futuristic character set.

Sadly the text is somewhat spoilt by poor spelling ("dis-saster", "forewards") and grammar ("torpedo's" as plural, but "a mans arm"). Whilst I've seen worse vocabularies this one is pretty tight, and the program isn't particularly user-friendly. The game is made more difficult by this lack of responsiveness — it's hard to tell when you're on the right track.

But I'm nonetheless very impressed by this product. The text really is some of the best yet seen on the Spectrum and with some fun puzzles included all for under a fiver Starcrash is recommended — provided you can tolerate the unfriendly aspects. Mail order from: Starcrash Software Systems, 1 Walsingham Avenue, Manchester M20 8WA.



FUTUREZOO

Clwyd Adventure Software
£7.95

Intergalactic peace depends on the recovery of The Great Seal of Senissa (an artefact, not an animal) before anyone notices it's missing. Unfortunately it is lost in the zoo of the future, which is made up of strange alien beasts from man's many planetary colonies. Guess who has to find it?

Futurezoo is Quilled, text-only and covers two sides of the tape. Some of the description is good, but it's enormously variable and in places is terribly dull. Vocabulary is very restricted: no EXAMINE, SEARCH, WAIT, LOOK or HELP amongst many others which should nowadays be standard. The program allows you to do very little: most of the time is spent just wandering around. You seem only able to do what is absolutely necessary for the solution: a simple example is that you cannot SWIM in any of the numerous pools and rivers in the game (the word is not understood). The problems are infrequent, uninspired and difficult due to the impossible vocabulary. The movement system is incoherent and unrealistic. Presentation is poor.

Futurezoo would only make a passable budget game with these faults: but its price is a death blow. The higher than usual packaging quality for a small company probably accounts for the ridiculous cost: at EIGHT POUNDS this is actually more expensive that some Level 9 games, as well as other far better products, and is hopelessly out of its league. I liked the plot but otherwise disappointing.



SOULS OF DARKON

Bug-Byte
£2.95

This game was released at Christmas by Taskset, and would have cost you eight pounds if you bought it then. Now, just seven months later, Taskset have disappeared and it's re-released for three pounds, a far more suitable price.

You land on the planet Megron. With only Komputa, your robot, to help, you must destroy Darkon, The Evil One, who is using the awesome power of combined sorcery and science to enslave the people.

On loading you immediately notice the superb presentation. At the screen's top is the location description, which is usually well written if not particularly informative, and remains static; as does the picture on the left. Your commands are entered at the bottom, and are scrolled up with appropriate responses and messages in the remaining screen space. Colour is perfectly used to emphasize the text, and there's an attractive character set. The good effect is spoilt somewhat when you start to type. The input routine repeats letters too fast, even when you tap the keys lightly, so commands like "ZZAPP ROOBOT" are common.

The graphics are. . .different. They are green and black, and appear rather wishy wash and easily disregarded. Still, they are instant and hi-resolution, generally well drawn, and often respond to your actions which is a pleasant surprise.

Science fiction is such a hackneyed adventure theme that to hold my interest the game must be special. This one stands out because the technological mumbo-jumbo is blended effectively into the fallen civilisation of Megron, which has reverted to a simple, medieval style life yet still retains futurist sculptures and surveillance robots.





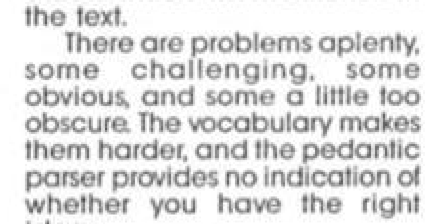
An atmosphere of bleak oppressiveness is created by the endless rain, the ancient ruins and strange relics. EXAMINE and LOOK must be used frequently to reveal important information, although the responses aren't always helpful. A command I liked was LEGEND, which, when used in certain places, describes their often sinister history and purpose.

That command is not mentioned in the instructions however, which are appalling. They're incredibly brief, don't explain unusual commands like ZAP, and are mostly nonsensical. To quote: "ENTER the commands. You will need to enter specific commands. . . SAVE saves your current position". The scenario is incoherent, and doesn't explain your powers enough or Komputa's function.

As with all the adventures reviewed this month, vocabulary is too limited at under 50 verbs. The parser is finicky about what it will accept and in particular character interaction is too difficult. Finding the right noun to examine is also tricky, and to enter buildings you must open a door which isn't mentioned in the text.

There are problems aplenty, some challenging, some obvious, and some a little too obscure. The vocabulary makes them harder, and the pedantic parser provides no indication of whether you have the right idea.

These faults are sadly common to a many recent adventures. Despite them, Darkon is an entertaining game which is sufficiently cheap for me to recommend to more experienced adventurers. Certainly one of the best budget adventures.



HELPLINE

A bulging parcel of helpline missives was thurst into the dungeon this month, and I'm pleased to see that more varied mail is being sent: I've had several offers of solutions (which I'll come to later). The internationalist nature of Mindplay readers is further revealed by letters from Sweden, Switzerland and Germany, amongst other far flung places (all in perfect English I might add, which is fortunate as my German is dodgy and my Swedish non-existent). In fact our foreign correspondents' English must be excellent for them to understand the adventures in the first place, and think up the correct word combinations (which, in the case of certain games, is hard enough to do when you are English).

Several letters concerned Interceptor's **Heroes Of Karn,** a fairly entertaining rip-off of the mainframe adventure with a few new puzzles and some extremely pretty pictures added. Neil Hodges asks, from the rustic beauty of Canvey Island, "what do you do with the serpent, and how do you cross the chasm?" You need to solve the former first. Take the bird cage from the sandy cavern (near the cell), then put the bird from the bird chamber in it (fairly obvious). Take the bird to the snake chamber and KILL SNAKE WITH BIRD. Go east and you'll find Istar, the wizard. Take him to his chamber and make him pick up the wand (also ask him to read the scroll for a time saving trick). To cross the chasm, he just has to wave the wand. This will create yet another problem, with a musical solution. Neil also sent a nicely presented map and solution to **Quest for The Holy Grail** (more on which later): thanks.

No Karn do

Meanwhile, Ian Stockdale sent a long list of pleas; in **Karn** he wants to know how to escape from the cell and what use the money is. Same answer: GIVE MONEY TO GUARD and he'll let you out (I, sadly, am not paid so cannot try the same solution here). Bosse Axelson from Sweden also had a load of questions, so he photocopied several help forms and wrote a problem on each. Not necessary Bosse: if there's a lot you want to know, send a letter (the coupon just makes it easier for people with short requests). Anyway, he wants to know how to deal with the bat, spider and witch. Dispose of the hag first: KILL WITCH WITH WATER (you'll need to refill the bottle). You'll eventually find the falcon, and will be able to type BEREN, KILL BAT WITH FALCON. Towards the end you'll find a merry minstrel (melts in your mouth, not in your. . .oh, never mind) and a lyre. So send the arachnid to sleep with a tune. A couple of other relevant tips: you'll need the flute again in the hall of infinity where you'll find the gold keys. Pass the hydra with the spear.

Another of Bosse's coupons asks a common question about Scott Adams' ever popular **Spiderman:** how to defeat Mysterio. The answer is a cop-out: you don't. But FEEL NORTH and FEEL SOUTH to find some ubiquitous gems.

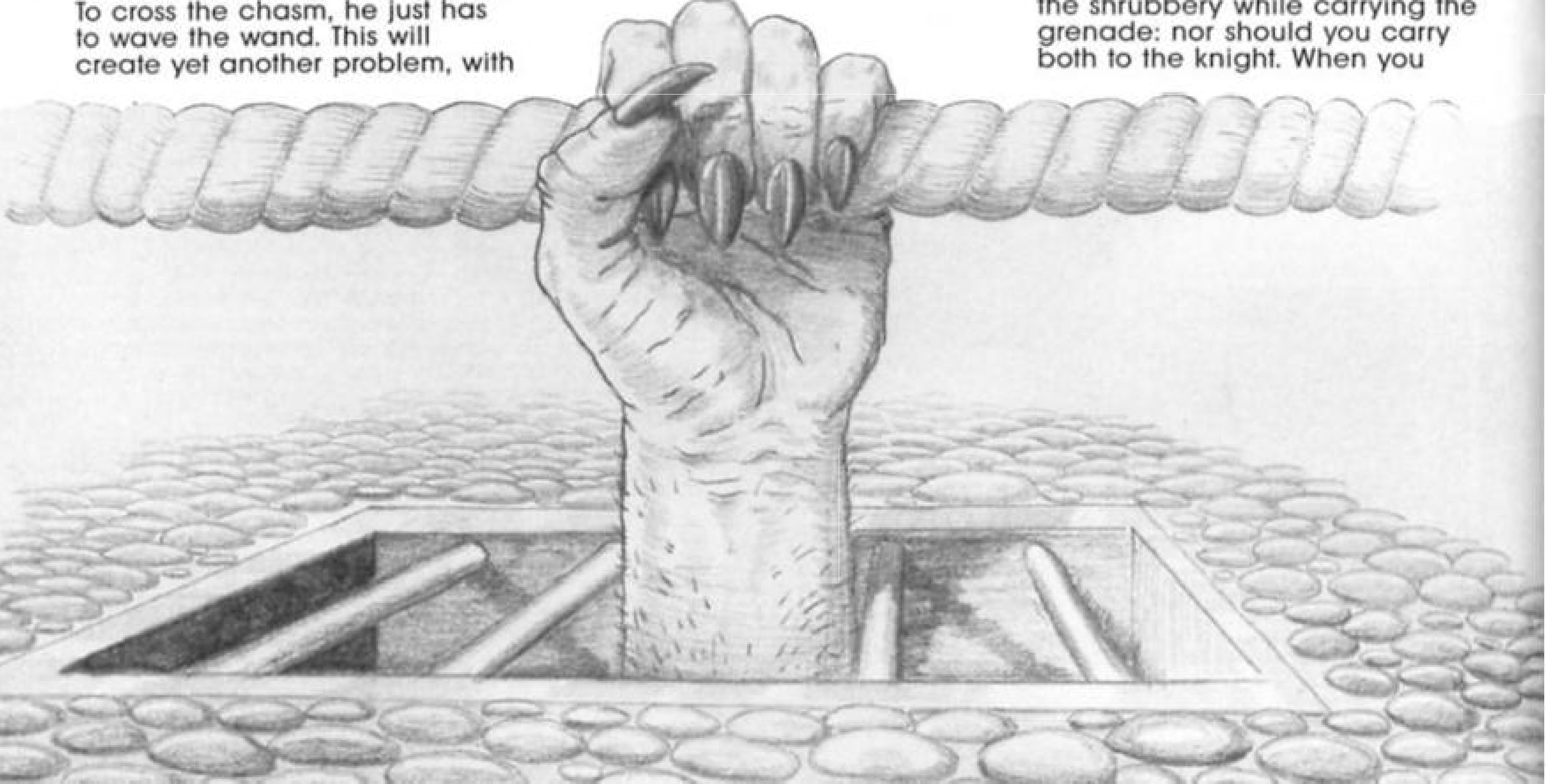
The Swedish adventurer is also flumoxed by Melbourne House's Classic sequel, **Mordon's Quest.** The transporter unit will store treasures and machine parts for use at the end: just TRANSPORT PIECE or whatever (keeps your hands free). In the arena, pick up the shield and sword, then impress the emperor with a display of cool using something from the future (clue: it gives you lung cancer). Further progress is automatic.

Colin Longsworth is having problems in the same game. The password for the door near the pool of oil is found by answering the 'phone. The solution to the minotaur problem is rather gory (readers with weak stomachs look away): kill it with your sword then SKIN it to find something useful inside (yeuch!). Mr. K. Cross is perplexed by the pygmy in the QL version. Take the bamboo, thorns and berries from the jungle area, and so MAKE BLOWPIPE. Once in his hut KILL PYGMY. He does have further use however.

Back to Bosse's posers. In the ancient **Espionage Island,** SHINE TORCH in the hole on the platform. And in Perseus and Andromeda, to fly with the sandals, WEAR them and WAIT.

Gruelling Grail

John Henderson cannot pass the knight who says "nic" in Mastertronic's sub-standard cheapie **Quest For The Holy Grail.** A long solution. You need to give him the pink shrubbery, which is found in Camelot. You must have the wooden edge and baseball glove to survive that castle. You cannot pick up the shrubbery while carrying the grenade: nor should you carry both to the knight. When you



meet the fellow, just GIVE SHRUBBERY TO KNIGHT and he will have a change of heart. There is, however, a catch: "creaking sounds" in the forests. If you hear more than five of these before meeting him he will rather illogically friz you regardless. Thus you need to plan your route carefully, always going through the "narrow forest trail" rather than the "forest glade" and "steamy forest". (But when you return from the knight's caves, go the latter route or you will be killed by a falling tree). In the same game, Roger Hembury asks where the holy hand grenade is and how to escape the holy grail cave system. To find the grenade DIG at the very muddy verge with the spade. To leave the caves you must kill the white rabbit on your first visit (what a wholesome, charming helpline this is turning out to be). As well as the grenade you will need the two books (one in Camelot, one near the knight) and the scrap of paper from the area west of the cave. Read the paper then the books for further instructions.

Roger asks some other questions, including this regular one about **Gremlins:** "how do I stop the snow plough from killing me?" Go to the pit in the petrol station and take the welding torch and gas bottle. Then, go back to the garage, OPEN VALVE, LIGHT TORCH with the igniter from the kitchen and WELD CONTROLS. He poses some questions about humorous **Hampstead,** the answers to which are: to get that extra credit sit on the bench on Hampstead Heath. The use of the bank is to employ you — visit the gentleman's club to gain the job. And you cannot open the cabinet in the department store — you want to FORCE the filing cabinet, which is in your office.

Storing stars

Dapples Pierre-Emanuel from Switzerland has found all 13 stars in **Sorceror Of Claymorgue Castle** (no mean feat) but cannot store them — and does not know what to do in the forest. The answer is store stars there! If you CAST PERMEABILITY SPELL you will enter a hollow tree, which is illuminated using the Firefly spell. Escape is only possible with the Yoho spell, thus you can only visit the tree twice, and the second time (having re-used the Yoho) you're trapped. So, when you have seven stars, take it and the three necessary spells to the tree, enter it, then use Yoho back to the field. Collect all the other stars, finishing in the dungeon, Yoho to the tree, and drop the stars to finish the game.

Mitchell Blower wants to know how to dry himself after entering the castle's fountain. The answer is with a towel, which you will find in a soggy form in the moat. WRING it to make it drier, then take it to the lava stream in the cavern. Drop it there and it will become useable. You'll need the Bliss spell or you'll be burnt to death — but you must use it elsewhere first, and it doesn't last forever, so plan carefully. In case you have not yet entered the lava cavern, PUSH EAST in the plain room then open the stone door with the Seed spell. The instruction booklet may have misled you into using that for the drawbridge — infact, to enter the castle initially you should swim through the moat. Don't forget to hold your breath. This incredibly complex game, definitely Adams' best, is even harder to explain than it is to play, but hopefully those hints are intelligible. Thanks to John Wilson for sending me the solution.

Denis the menace

Finally some help with fiendish political adventure **Denis Through The Drinking Glass.** James Strauss from New Orleans cannot get started. I wouldn't have thought the game made any sense to an American (with dated references to Greenham Common, Tony Benn, the GLC and Keith Joseph); anyway, two problems face you initially. The first is booze, or lack of it; well HIDE in the cupboard under the stairs until Maggie leaves, then enter the master bedroom, look at the pot for a flask, and take a sip. You have to DRINK every ten moves or so otherwise sobriety comes and the game ends.

The other problem is leaving Number 10. To do this collect sheets from both bedrooms, KNOT both sets, then KNOT the knotted sheets themselves.

With this you will be able to exit east from Den's den, out the window. Don't forget to wear something, or else The Sun (a popular British "news"paper) will feature you, nude, on page three. John Barnsley cannot progress any further. Well, try WITHDRAW MONEY from the bank — and HELP is often responsive, if not always polite. Thanks to John for offering solutions to a large number of games, some of which are used in this issue.

Adventure Aid

I'm encouraged by the bulging mail parcels I'm now receiving. Keep those offers of solutions coming! And remember — I'm the Claire Rayner of the adventuring world. So, if you've got a problem, just fill in the coupon. Will you do that for me luvvie? Will you?

Remember, I give a personal reply if you enclose an SAE. This can sometimes take a little time however, as I often have to refer to the game in question. And I only deal with adventures — I had a question about Elite this month!

The address to send your coupons, condolences and love is: Mindplay Helpline, Deepest Dampest Argus Dungeons, ZX Computing Monthly, No. 1 Golden Square, London W1R 3AB. It would help a lot if you write the name of the game(s) you are asking about on the back on the envelope (or "Solutions" if you are offering help). Also, by all means enclose a letter, but if you enclose both a letter and coupon, please write "letter enclosed" on the coupon (I keep losing them otherwise). Have a nice month, until you next join me down here. . .

Title: ....

Company: ....

Problem: ....

....

....

I can help solve: ....

Name: ....

Address: ....

....

MINDPLAY EXTRA

Gordon Hamlett is drafted into the dungeon to help with the torrent of adventure releases.

THE SNOW QUEEN

Mosaic/St. Brides
£9.95

Based on the fairy story by Hans Christian Anderson, the Snow Queen lets you accompany Gerda, trying to rescue her friend Kay. Kay has been captured by the Snow Queen after the devil's mirror broke and splinters entered his heart placing him under an evil enchantment. This involves a long and arduous trip to the Ice Palace.

The story starts with Gerda in her grandmother's house and the first problem is to find a way out — there are two things that must be done before you are allowed to leave. Once outside, hunger soon sets in and you must find some food quickly or else you faint from hunger. The game follows the story fairly closely although there are some additional problems to be solved. The tone of the game is very much in the style of a fairy story and this means that the game is aimed fairly and squarely at younger players. A typical problem is getting past "a group of tough girls who have stayed up all night", a description that I suspect will bring howls of laughter to any adolescent boys playing it.

The vocabulary is straightforward with a list of unusual words being included in the instructions. I felt that it was a bit too fussy at times. When you help the little old lady, she presses something into your hand but you can only find out what it is by examining the inventory. Or when you find something on the ground, you must examine the ground first in order to find out what it is. The game has been put together using the Quill and Illustrator and there are a few colourful pictures to look at. On the whole though, I found this game to be quite disappointing and somewhat overpriced at just under £10. Aimed at younger players, I suspect that they may prefer something a bit more exciting.





THE VERY BIG CAVE ADVENTURE

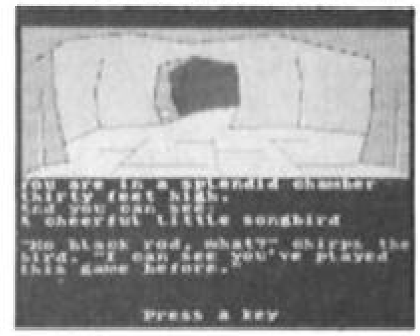
CRL
£7.95

Whilst casually hacking into one of America's major computer networks, one of the pupils from St. Brides (for yes, it is they that wrote this thing) accidentally discovered a copy of the first adventure ever written. This was unfortunate as she was trying to divert huge governmental funds into her own personal account at the time. But there is something entrepreneurial in all of those girls and a way was soon found of using the discovery to make a few bob on the side.

If you are losing interest in this review already on the grounds that you have already played one of the 1001 different versions of this game, then please bear with me for I assure you, you have never played anything quite like this. To say it is a spoof on the original is like saying that War and Peace is just a book. Herein lies the problem though as it is very difficult to talk about the contents of the game without giving too much away. Some of the jokes are very clever whilst others are so dreadful that you laugh anyway.

All the old familiar faces are there, the locked grating, the bird, the cage and the rod with a rusty star on the end of it but don't expect to use items as you did before. There are also several new ideas. Just off the Hall of the Mountain King, you can go and have a game of Space Invaders — a text only version of course! And how about a visit to Gotham City in the Batmobile or exploring the Habitat and Laura Ahsley rooms. One of the nice things about the game is that it pays to be silly as these responses have been anticipated and you get an even sillier response back. For example, if you examine the cage, the program promptly shuts you inside it and the keyboard hangs up just long enough for you to get really worried about it. Other things worth trying include swearing at the program and kissing yur guide, Trixie Trinian, one of the prefects.

The game is put together using the Quill, Illustrator and Patch although you would never guess from looking at it. There are all sorts of sounds and time delays built in to keep you amused. The graphics are also



well done and add to atmosphere. Because it is so subjective, humour is a very difficult element to include in a game but suffice to say, I laughed out loud at CAVES time and time again. This is bound to be one of the adventure successes of the year and should be very high on your list of potential purchases.

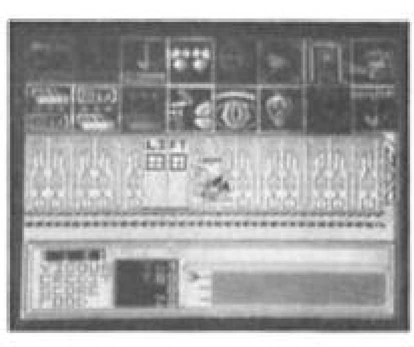


A TICKET TO RIDE

Mastertronic
£1.99

The outpost of Selexia Central is about to be abandoned. All the Federation resources and services will be shut down in twenty-four hours. If you wish to leave (and the alternative is being marooned for eternity) you must make your way to the docking bay. You must produce a passport, a shuttle ticket, 2048 credits and a resettlement permit before you will be allowed to board.

Ticket to Ride is an icon driven graphic adventure. You must find your way around the complex, buying and selling items in order to make money and also trading various items using a link terminal. Moving round the outpost (either joystick or keyboard may be used) takes some getting used to. You can only move left and right across the screen changing



directions only at specified junctions. The screen informs you whether you are on a N/S or E/W pathway. Drawing a map is essential if you are to find your way about. Fortunately, all the streets are numbered to offer you some assistance. Incidentally, the screen display for the streets is some of the most garish that I've come across. Whilst most of the streets are just walkways, many contain shops or lifts that can be entered.

Pressing the fire button allows you to access the bank of sixteen icons at the top of the screen. Amongst the commands are buy and sell objects, select items from inventories and enter and leave buildings. You can carry up to three items at once and if you enter a store, there is a list of three items that the store keeper is interested in buying or selling. You can ask for information about a particular trader as well as examining any items that you purchase. All the time this is happening, time is ticking away. So too is your energy which can only be replenished by eating. The bottom third of the screen displays all your current statistics.

Once you get used to the dreadful screen display and using the icons, Ticket to Ride proves to be a highly original and challenging game and at the price, who's worrying about what it looks like.



KENTILLA

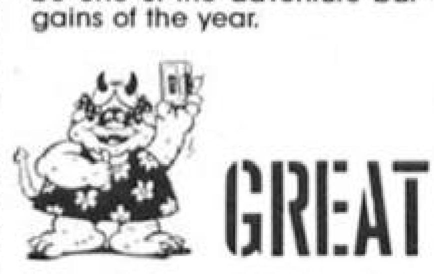
Mastertronic
£1.99

One of the nice things about budget software is that it gives you the chance to catch up on some full price games of yester year that for some reason or other you missed at the time. One such title is Kentilla, a little gem of an adventure that has just been re-released.

On the face of it, the game does not appear to be anything special. There is the usual sort of quest of defeating the evil Grako with the magic sword Kentilla, but believe me, it is a quest that will take some attaining. To start with, you are given very little information about your task, but must find out as you go along. You will also need to backtrack considerably, re-visiting previously explored locations.

Another feature of the game is that you will need to talk to a lot of characters. If they are friendly, they will help you wherever possible. If not, well it depends how they feel. The characters are many and varied. Urga-mauls are nasty in the extreme and the rattling quarg also seems to attack you without provocation although you should get considerably more joy out of the family of cavezats. These cavezats are a right homely bunch with descriptions such as fat, ugly, chief, thin and small. There is seemingly very little lying around and everything must be examined carefully.

There are some small illustrations to accompany certain locations and location descriptions are by and large sparse but for all that, the game evokes considerable atmosphere. And at only £1.99, *Kentilla has got to be one of the adventure bargains of the year.*





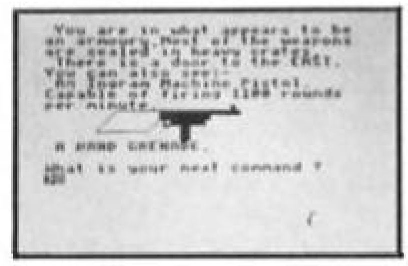
MAFIA CONTRACT II — THE SEQUEL

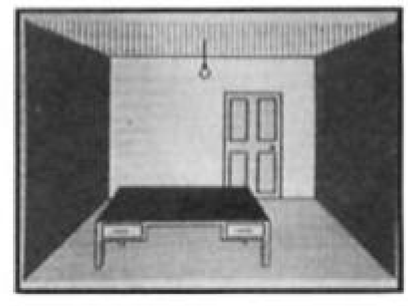
Atlantis
£1.99

Having seen off your Boss's rival gang leader, you have been promoted to his personal bodyguard and advisor. A gang war has flared again though between your family under Don Capolla and the Vito Rossi mob. Capolla has gone into hiding but yet again, he has run scared and put out contracts on anybody and everybody who may be a potential threat *— and that includes you! So, not* content with protecting your boss's skin any more, you decide to kill both Rossi and Capolla, find the hidden documents which give details of Don Capolla's gunmen and then take over control of first the family and then the city yourself.

The game starts with you in your office in Don Capolla's mansion. A fierce battle is going on outside as the two gangs slug it out. Your first main problem is to get out of the house without being mown down in a hail of bullets. The way the game works is that one false move and it is game over time as Rossi's hoods mow you down. Most of your actions are fairly obvious though and it is only if you do something silly like going to sleep in the bedroom will you have to start again. Then it is escape from the grounds through an electric fence and make your way to town.

Mafia Contract II is a fairly standard Quilled adventure





with pleasant enough graphics. Ramsave and ramload are very useful facilities allowing you to save a position temporarily in memory without the hassle of fiddling with tape recorders and I would recommend that you make good use of it, especially as you get killed so *frequently. The game itself is* reasonably easy and I have not yet come across any obscure words in the vocabulary. Combine this with a convincing storyline and atmosphere and it adds up to probably the best adventure that Atlantis have so far released. Good value for £1.99.



TERRORS OF TRANTOSS

RamJam/Ariolasoft
£8.95

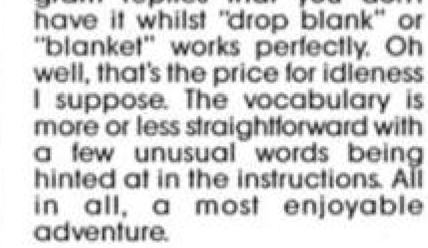
Aeons ago, the evil Wizard Trantoss used to rule supreme, gaining his powers through his mace. This continued until the villagers stole the mace and broke it. Over the years, the servants of Trantoss have tried to reassemble the mace and there are ominous rumours that Trantoss himself is not dead. Villagers have started to disappear, including the parents of two brothers, Lobo and Scarn. They decide that they must do something to stop this dreadful evil. The villagers are only too willing to give them every assistance, pleased that someone is going to do their dirty work for them. A lot of treasure has also gone missing and it would be a pleasant bonus if the two lads could retrieve that as well.

Of the two boys, one is as strong as on ox whilst the other is small and agile. This is important to remember as each will be more suitable for performing different tasks. You can move both characters together (this will be most of the time) swapping between them at will or you can part them and send them off on different tasks. In theory, you can succeed if one of them gets killed but in practice this will be almost impossible.

The story starts in the village and you must collect various provisions before going into the tavern and getting a dark stranger to guide you on the secret paths through the woods. The stranger also leaves you a magic staff when he disappears. Examining this gives you a real headache. There is writing on the staff but it is in the form of some runes and there are more of these strange letters over the ravine at the gates. At this point I sat down for a bit of code breaking — at first it looked easy as the first two words on the staff looked fairly obvious but several hours later I was both cross and frustrated. The letter combinations just did not make sense. Back in the game, I eventually found out why when I discovered a patent rune translator. Not all the words are spelt in ways that would appear in the Oxford Dictionary!



The on screen presentation is very attractive. On the left is a vertical format picture of your current location, bright and colourful. A central strip indicates which character you are currently controlling and whether or not the other brother is with you or elsewhere. On the right is the text entry box. The only problems here are that the program checks the first five letters of a word. This can be confusing if, like me, you are used to using only the first four. Type "drop blan" and the program replies that you don't have it whilst "drop blank" or "blanket" works perfectly. Oh well, that's the price for idleness I suppose. The vocabulary is more or less straightforward with a few unusual words being hinted at in the instructions. All in all, a most enjoyable adventure.



HUNCHBACK the adventure

Ocean aren't exactly renowned for adventure products, and for them to release a second one following last year's Never Ending Story is significant. Obviously they feel the market exists, since the company is always commercially motivated.

I'm sure you will have worked out yourself who you play; your task is to rescue Esmerelda from the evil Cardinal. To do this you must battle past the guards and the Bishop in Notre Dame, escape through the Paris sewer network, then confront the Cardinal at his mansion and rescue your sweetheart.

The whole product is polished in a way only Ocean could manage. On loading a pleasant, full blown musical piece plays while you read the credits. Then you notice the slick presentation — split screen graphics, good use of colour and a redesigned font.

The graphics system is unusual. An attractive Parisian scene remains on screen constantly as a background, whilst small pictures of any objects you are holding are printed on top of this together with either an illustration of the current location, or a picture of the humped hero himself. The problem with this overlaying is that the smaller graphics have only thin black borders and tend to merge into the backdrop. Still, you eventually learn to pick out the relevant areas, and what you see is good: high quality and worth the effort, unlike in many adventures. The pics frequently capture cartoon style; a similar atmosphere pervades the whole game.

By keeping the graphics small, there's enough room for reasonably lengthy text. Although this is not particularly descriptive, it provides all the relevant information and is stylish and sometimes witty. I liked the constant references to your character: you stand "in your own inimitable way", and can see east and west, "which is pretty impressive considering you've only got one eye." It can be self mocking, and occasionally parodies general adventuring. The balance between text and graphics is just right. Shame the author doesn't know that proper nouns have capital letters.

Gameplay is disappointing. I expected Ocean's technical capability to produce a more sophisticated parser; instead we have an under fifty verb vocabulary, with no EXAMINE, although fortunately the words understood are listed in the instructions. You are unable to do much.

Not that there seems much to be done. Although I haven't yet made much progress (not least due to the infuriating vocabulary), there are few apparent problems to be solved — certainly this was the case with Never Ending Story. Much of the game would seem to be moving around, and finding a use for the objects. But I will reserve full judgement on this until I at least reach part two.

This adventure is similar in many respects to Ocean's arcade games. It's slick, looks impressive, has pretty graphics, and is technically competent; but underneath the gloss, it lacks substance. This game is thus not for the purist, but occasional adventurers may enjoy it — and that's probably the market Ocean are aiming at.





ADVENTURE

Hunchback: The Adventure
Ocean
£7.95


the cathedral. To the west lies
a corridor and to the northeast
, southeast and east are three
walkways.
>ne
The north balcony. There are
exits leading off to the east ,
southeast and southwest.
There is a small tightly
meshed net here.
>
The south balcony. Exits are
to the west , northwest and
northeast.
The guard attacks!
The guards blow wounds you!
>fight guard
You attack with your bare hands!
Your attack fails!
The guard attacks!
>



Fight terrorism, control the Pentagon and pander to the President in Electric Dreams power crazed crisis management game.

Hijack
Electric Dreams
£9.99





Hijack is novel new game that Electric Dreams describe as a 'combination of arcade, strategy and simulation.' In the game you play the part of the Head of the Pentagon's new Hijack Division. As the game begins you are faced with the problem of a group of terrorists who have hijacked a vehicle and its passengers, and it's up to you to coordinate the Pentagon Staff and deal with this crisis in whatever way you can.

You control an animated figure whom you can direct to move from room to room within the Pentagon, and as you move around you will encounter members of staff (most of whom will obey your instructions) and attempt to locate information that will help you deal with this crisis.

There are two main parts to the game. At first, whilst still based in the Pentagon, you have to amass either enough money, political, or military power to enable you to enter negotiations with the terrorists. Once you have convinced the President himself that you are in a strong enough position he will then send you off to the scene of the crime to tackle the terrorists.

Most of the screen display is given over to a representation of the current location, and of your figure's position in that room. As you walk across the room, any potentially useful items that you come across are highlighted in a small box at the bottom left-hand corner of the screen and these can be examined or picked up and held for later use. Held objects are displayed in a second box on the bottom right-hand.

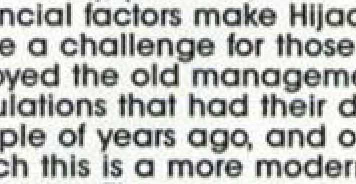
Along the top of the screen display is a row of faces representing the key members of staff that you will have to deal with, and whenever one of them enters the room that you are in a walking figure will be seen in the room and the appropriate face will light up, indicating the identity of that person. These personnel are a number of Political, Military and Financial advisors and their assistants, and there are also agents of the CIA and FBI who can be used to dig up information on the terrorists, and on possible security risks within the Pentagon itself.

For each member of staff you are able to 'pull down' a menu containing the different orders that you might want to give him/her. For instance, you could order the Military Advisor to go straight to the scene of the Hijack, or to stay in the Pentagon and try and find a solution through the intelligence network. You could even fire him if you want, though obviously he won't be any help to you if you do this (then again, if he turns out to be a security risk you're better off without him).

This is where the strategy element comes in. Each command that you can give will have different sets of results and consequences, and you've got to judge how best to balance these results in order to achieve the bargaining power that you'll need. This isn't always easy, since boosting your financial power could affect your military or political strength — for instance, getting your financial advisor to rush off and raise money from some of your political supporters can put a strain on their loyalty and weaken their support.

On top of all this, there's the President who is unduly concerned about his image and won't give you the help you need unless you mastermind his (expensive) PR campaign. The number of characters that you have to deal with, along with the problems of balancing all the military, political, and financial factors make Hijack quite a challenge for those who enjoyed the old management simulations that had their day a couple of years ago, and of which this is a more modern derivative. The animation and window-menu system bring it up to date and increase the playability of the game, making it more visually attractive.

I doubt whether the arcade aspects of the game are strong enough to appeal to fans of death-dealing shoot 'em ups, but for those who enjoy a challenge to their strategic abilities rather than their joystick, Hijack should provide something to sharpen your wits on.



CROSSFIRE

An international mailbag this month with views and advice from Dallas, Jordan, Kuwait, Holland and Barton on Sea.

Machine Code Aid

Dear Sir,

Re-the letter from Mr. Wade-Cooper about machine code in the July issue. I also find that my typing is both slow and not all that accurate as I tire.

This simple program allows you to enter code in short sessions, and to correct the odd errors that always occur. All of the Hex is put into DATA statements and a short program run when this is complete. The program stops when an error is found, giving the line. This is corrected and the program re-run until it is free from all errors. With a large number of bytes, the DATA will use a considerable part of the memory, and the code may not be able to go in at the correct address without corrupting the DATA.

However this is not a real problem since the code can be saved to a higher address, the computer cleared, and the code re-entered at the required address. For example, 6000 bytes can be saved to 55000, and re-entered at 30000.

The program:—

```
1 REM x = number of characters per line
2 REM 1 = line number, starting at 101, 102, etc. to the end
5 CLEAR n—1: LET n = start address
10 FOR 1 = 1 TO end
15 PRINT AT 0,0: "        " AT 0,0;1
20 READ a$,t
25 IF LEN a$<>x THEN PRINT "Length error Line";1:STOP
30 LET tot = 0: LET c = 0
35 FOR b = 1 TO LEN a$ STEP 2
40 LET y = CODE a$(1) — 48: IF y>9 THEN LET y = y — 7
45 LET z = CODE a$(2) — 48: IF z>9 THEN LET z = z — 7
50 LET c = 16 * y + z
55 LET tot = tot + c
60 POKE n , c
65 LET n = n + 1: LET a$ = a$ (3 TO)
70 NEXT b
75 IF tot<>t THEN PRINT "Error Line ";1:STOP
80 NEXT 1
85 PRINT "All OK": STOP
101 DATA etc as required
```

NOTE:— n = high address chosen to be above the DATA lines end = last line number. t = checksum. If this is in the Hex data then some changes will be needed to extract it in place of t.

When the program stops at LINE 85, the CODE can be saved . . .' SAVE "?" CODE high address, number of bytes'. I hopes that this will be of use to Mr. Wade-Cooper.

W.S. Critchell, Barton on Sea, New Milton.

Pen pals

I would like to mention how much I like your magazine because it is very useful for any ZX user. I am a 15 years oldJordanian boy, my machine is a 48K ZX SPECTRUM, I would like to have pen pals to exchange games, POKEs, tips and hints with. All letters will be answered in a short time.

Khaldoon Tabaza, PO Box (8156), Jabal Al Hussein, Amman - Jordan.

Centi Conversion

Dear Sir,

A note of interest for your US readers. The Centi Program from April ZX can be run on the unmodified TS2068 by inserting the following pokes into the basic program prior to the RANDOMIZE USR after loading the code. POKE 60014,48: POKE 60015,18: POKE 60865,217: POKE 60866,9: POKE 60885,195, POKE 60886,9. The changes the rom calls to match the equivalents on the 2086. Of course it will run unmodified if you are running a 2086 with a Spectrum ROM.

Jack Keene, Dallas, Texas.

Lost monster

I am trying to find someone who might have or know of anyone owning a ZX81 game called 3D Monster Maze from J.K. Greye Software. Can anyone help?

R. Lacey, The Dairy Farm, Chaple Lane, North Cockerington, near Louth, Lincs.

Discovery Users Club

Dear Sir,

As you may or may not know, in Holland there is a very active support group for users of the Opus Discovery. The Discovery Users' Club (DUC, as we call it) has now grown to more than 200 members internationally. Thanks to messages and short articles in magazines such as yours, we now have members in countries as far apart as Sweden and Zimbabwe.

Most of what the club does is pretty much standard for user clubs. Naturally it is all specific for the Opus Discovery. . . We don't do really much with general Sinclair news unless it affects the Opus Discovery in some way. Also, we issue a two-monthly periodical, which is always chock-a-block full of specific Opus news. We test all software which is purported to Opus-compatible; the same goes for hardware.

We have managed to modify programs to support the Opus functions. We have programs to transfer programs from cassette to disc (which can be quite a chore, sometimes).

Besides all this, we have a program library with home made programs, all of which utilise the Discovery functions to the full (Ramdisc, etc, etc.). These programs are really of a high standard (a questionnaire learned that few members were specifically interested in games!).

We have two helplines for members with questions or problems regarding the Discovery and its use. Both these helplines have a very busy life, and are pretty well constantly engaged. Despite that, they find time to place an article on communication in each DUC magazine (which we issue in three languages).

As you can see, we are very much a user-orientated club. We have much to offer, especially to the more serious Spectrum user who has bought an Opus Discovery to support his system. Having heard of good sales reports, we know there are more Discovery owners than there are members of our club. We especially invite those people to write to our secretary for more information.

Further information from Dick Kruithof, Boeierkade 6, 2725CH Zoetermee, The Netherlands.

Hot tip

Dear Sir,

With reference to your Crosswires section in the June ZX. I wanted to pass on the information that you can use NCR paper on the ZX printer. NCR has rolls of thermal paper that are suitable for the ZX printer.

Although I do not know the reference number, you can ask any NCR dealer that you want thermal paper for their thermal printer 2600, (it's the one they use in conjunction with NCR Criterium computers).

You can cut the rolls to the correct size with a metal saw. It works well, I tried it.

Thanks for your nice magazine. It helps in Kuwait to have a Spectrum to keep us inside. With an external temperature of 43c you should know better than to go outside.

Francisco Fontes, Salat, Kuwait.

FORMAT, JAMMING & -Piracy-

Mathew Palmer shows how to nurse a microdrive back to life.

If you own a QL or a Spectrum with a microdrive, you will know of the problems you have with the cartridge when it jams and the frustration it causes when you realise you have not made a back-up copy of the data on the cartridge. There are two ways to repair jammed cartridges and the first is to take the item apart.

Taking the cartridge apart is a very sensitive job, so much so that this should only be done at first with a totally useless and corrupted cartridge. The first thing to do is to prize away the "Grip" with a fine, small screwdriver. The grip is the black coated part of the cartridge that the user is most likely to touch in everyday usage. Older versions of the cartridge come off quite easily, on newer versions the "Grip" has been glued on and is liable to shatter, but this is not an important part of the cartridge. A small seam will become apparent all the way along the edge. Using your screwdriver, remove this final barrier by prising the seal apart. You must be careful not to break any of the two outer shells that make up the main body, as you may have to reassemble the cartridge again.

Instantly the cover comes off you will notice a large white wheel in the centre of the cartridge. Under the cover of the wheel, carefully wrapped around the centre of the wheel is the spool of the tape. The tape has a lead going out from the centre of the wheel, past the yellow wheel over the foam pad, down past the smaller white wheel and back to the tape, but instead the tape goes to the outside of the spool, thus causing the medium to be known as "continuous" or "infinite". In most cases of jammed cartridges, if you look carefully at your cartridge inside, you will find that the reason the cartridge has jammed is because the tape is caught against the larger white wheel. Once untangled, using anything but your fingers, replace the lid of the cartridge firmly and make a Directory. If successful make a back-up copy of the data on the ex-jammed cartridge onto another cartridge and throw the old cartridge away.

A simpler and less scientific method of retrieving data from a jammed cartridge is to put the cartridge back into its sleeve, hold the cartridge three foot above a wooden table and "throw it" against the surface. You will find in most cases that the cartridge is now ready for use but make a back-up copy of it, as it is possible that it may jam again. If either of the methods fail, though unlikely, I can only say that you have lost nothing but gained experience.

Formatting

Formatting seems unnecessary to a number of people, this is because they do not know what is involved and needed to store data permanently on a magnetic medium. As with any computer controlled storage system, formatting is necessary but can (in human terms) be explained. Imagine using a blank A4 piece of paper, you are told to write a report on this piece of paper consisting of exactly 254 lines of text. Apart from the fact you would find it very hard to write in a microscopic style of handwriting, you would find it very hard to write neatly without some guide lines such as feint and margin. This is exactly what formatting will do to the cartridge, it will give the computer the ability to store data neatly on the medium in allocated areas. These allocated areas are called sectors.

The Format Command when executed, numbers and divides the tape into sectors, starting with sector number 254 the numbering goes down in steps of one until it reaches sector 0. If there is not enough room on the 17 feet of tape for all the sectors, the Microdrive overwrites the first sectors created. Therefore when sector 0 is finally created the sector number next to it will also

be the amount of sectors created in the format. In addition to creating the sectors the format command fills the sectors with pseudo data, which when the data is later verified, if the data is not what it should be the data is rewritten on to the sector again, only if the following check fails again is the sector concerned recognised as faulty.

Each sector is not totally made up of user data. For instance there is the sector number and the medium name, both of which are created and stored during the formatting of the cartridge, in the SECTOR HEADER. The sector headers' purpose is basically a one line index to tell the computer what Microdrive cartridge is it looking at (has it changed?) and if not, what sector is it looking at. On the basis of the computer being able to identify different cartridges. The question arises, if you formatted two different cartridges with the same names would the computer find any differences? Yes is the answer because apart from the sector number and the medium name there are two pieces of data that the user never knows about in the sector header. One is a 16 bit random number that is generated when the format command is executed and is the same throughout the cartridge. This also is checked when the header is read, the probability that the number could be identical to a number on another cartridge is 1 in 65536 (or 2 16 or pretty slim). The second piece of unknown data is a check number that has the job of mathematically telling if the sector header has at all been corrupted.

Pick a number

The idea of random numbers has been extended one step more by most software houses. The improved idea is simply to format a Microdrive with a set number instead of a random number and save the purchasable program as normal. Using software specially written to look for the known number on the cartridge and once found, the computer could therefore allow the user access to the software as the cartridge has been identified as genuine. This idea is best shown up in Psions' Chess and Talents' Zkull. However, gremlins called "software hackers" have also noticed this technique and have written software to find the alleged random number and format a cartridge with corresponding number. They then make a back-up copy of the master on to the other cartridge, which when examined by the Microdrive is "identical" to the master. Much to the frustration of the software industry, they have had to respond with alternative methods.

With expensive utilities and languages the industry started to come out with software with additional pieces of hardware such as ROMs and Lenslocks. Both of these pieces of machinery brought the prices up and both had their faults. The first was losing it, the second was finding it broken under your foot. The less professionally orientated packages, such as games, opted out of these ideas and came out with other tried and tested methods. Eidersoft for instance have taken a piece of their software and encoded it on to a grid. The grid consists of numerous coloured alpha-numeric characters that are shown on the inlay of the documentation. Given the grid reference point, the user types in the corresponding character and thus, if correct, it allows the user to continue. This idea may seem fool proof but it is nothing a colour photocopy of the grid cannot solve for the persistent hacker. Either way, no matter how hard the industry tries, software is never safe, because the security routines are just routines and as such the return command could be poked in at the beginning of the routine and make it void.

TRANS ~ DISC EXPRESS

John Wase has developed a utility program for Discovery Disc Drive owners to enable them to use the catalogue file.

The Discovery manual is, on the whole, very well written for the BASIC user. One of the very few deficiencies is in describing how to use the catalogue file as a random access file. The description is very abbreviated and there is no example; probably to discourage "fiddling", which can be a disaster — you can easily lose all the files on the disc, as I did!

The Problems

From a number of enquiries that I've had, it is evident that quite a lot of readers have had similar problems. Now it also happens that when you use discs of two different sizes (as in my system), the firmware will let you copy only disc 1, so that one type of disc cannot easily be copied. I therefore thought I'd kill two birds with one stone, and write a backup program for disc 2.

The Pitfalls

Beware! In my first attempts, I opened the "CAT" channel and corrupted a disc catalogue; it's easily done. Eventually, I had to get my friends to help (as usual). The result is this program, and although it's got quite a lot of REMarks in already, I thought a few explanatory notes might help.

The Program

In lines 100-180, values are assigned to four variables, channel 0 is closed (in case it's been left open), and the user is instructed to put in discs as indicated: the main loop then follows in lines 200-270, which direct control to four subroutines in order.

The Subroutine

Lines 300 to 520 contain the first subroutine (D2- D1). Line 310 opens stream zero to the "CAT" channel on disc 2, as a random access file of 16 bytes, see the Opus manual, p.28, section 6. This mentions that the entry consists of 3 two-byte numbers followed by a string of numbers containing the name of the file. Line 330 points to the records in turn, starting with number 1. 340 reads the first two-byte number, 350 the next and 360 the last; this is the only one which really concerns us as, if it has the value 65536, it marks the end of the file. In this case "end of catalogue" is printed (line 380) and control is returned to the main loop.

The Snag

The rest of the subroutine is now straightforward, apart from one snag. Line 430 reads the name, the snag being that the first is merely the disc title and one doesn't want that file. Line 440 gets round the problem with Boolean logic. The rest of the subroutine prints up the titles and moves the remaining files one by one to the blank formatted disc in drive 1. After that, a blank formatted disc is substituted for the transmitting disc in drive 2 (subroutine 600), the disc 1 catalogue file is similarly read, and each file is transferred and then erased from disc 1 (subroutine 700).

The Counters

Just one small point. I guessed that no one has eight 40K files in a row, so the program transfers eight files at a time. If you have a lot of very big files, then you will have to alter the counters w, x and y (z is OK because it is merely used to ignore the first catalogue after the first run through).

There it is, then; a small utility which I find very useful, and I hope you do, too.

Listing

```
  10 PRINT                              "
********************************
*                              *
*     PROGRAM TO COPY DISCS    *
*  ON AN OPUS DISCOVERY SYSTEM *
*  EQUIPPED WITH DISC UNITS OF *
* TWO DIFFERENT SIZES OR TYPES *
*                              *
********************************
"
  20 PRINT : PRINT : PRINT INK 2
;"   ***D. A. JOHN WASE 1986***"
  30 PAUSE 200
  40 CLS
  50
 100 REM INITIALISE
 110 LET title1 = 1
 120 LET title2 = 1
 130 LET y=0
 140 LET z=0
 150 CLOSE £0
 160 PRINT "PUT BLANK FORMATTED
DISC IN     DRIVE1"
 170 GO SUB 1000: REM CHANGE TO
TRANSMIT
 180
 200 REM MAIN LOOP
 210 FOR a=1 TO 1000
 220 GO SUB 300: REM D2->D1
 230 GO SUB 600: REM CHANGE TO R
ECEIVE
 240 GO SUB 700: REM D1->D2
 250 GO SUB 1000: REM CHANGE TO
TRANSMIT
 260 NEXT a
 270
 300 REM SUBROUTINE D2->D1
 310 OPEN £0;" CAT ";2 RND16
 320 FOR w=1 TO 8
 330 POINT £0;w+y
 340 LET lb=CODE INKEY$£0+256*CO
DE INKEY$£0
 350 LET startblock =CODE INKEY$
£0+256*CODE INKEY$£0
 360 LET endblock=CODE INKEY$£0+
256*CODE INKEY$£0
 370 IF endblock<>65535 THEN GO
TO 430
 380 PRINT "End of catalogue for
 disc 2"
 390 PAUSE 100
 400 CLS
 410 CLOSE £0
 420 RETURN
 430 LET n$="": FOR n=1 TO 10: L
ET n$=n$+INKEY$£0: NEXT n
 440 IF title2 THEN PRINT "Title
 of Disc 2 is ";n$: LET title2=0
: GO TO 470
 450 PRINT n$;" moving from D2 t
o D1"
 460 MOVE 2;n$ TO 1;n$
 470 NEXT w
 480 CLS
 490 CLOSE £0
 500 LET y=y+8
 510 RETURN
 520
 600 REM SUBROUTINE CHANGE TO RE
CEIVE
 610 PRINT "PUT RECEIVING DISC I
N DRIVE 2"
 620 PRINT "Press any key to con
tinue"
 630 PAUSE 0
 640 CLS
 650 RETURN
 660
 700 REM SUBROUTINE D1->D2
 710 OPEN £0;" CAT ";1 RND16
 720 FOR x=1 TO 8
 730 POINT £0;x+z
 740 LET lb=CODE INKEY$£0+256*CO
DE INKEY$£0
 750 LET startblock =CODE INKEY$
£0+256*CODE INKEY$£0
 760 LET endblock=CODE INKEY$£0+
256*CODE INKEY$£0
 770 IF endblock<>65535 THEN GO
TO 850
 780 PRINT "End of catalogue for
 disc 1"
 790 PRINT
 800 PRINT INK 2;"    ALL TITLES
 TRANSFERRED"
 810 PRINT
 820 PRINT INK 2;"          TO N
EW DISC"
 830 CLOSE £0
 840 STOP
 850 LET n$="": FOR n=1 TO 10: L
ET n$=n$+INKEY$£0: NEXT n
 860 IF title1 THEN PRINT "Title
 of Disc 1 is ";n$: LET title1=0
: GO TO 900
 870 PRINT n$;" moving from D1 t
o D2"
 880 MOVE 1;n$ TO 2;n$
 890 ERASE 1;n$
 900 NEXT x
 910 CLS
 920 CLOSE £0
 930 IF z=0 THEN LET z=1
 940 RETURN
 950
1000 REM SUBROUTINE CHANGE TO TR
ANSMIT
1010 PRINT "PUT TRANSMITTING DIS
C IN DRIVE 2"
1020 PRINT "Press any key to con
tinue"
1030 PAUSE 0
1040 CLS
1050 RETURN
```

MADE IN AMERICA

COMPETITION

Here's your chance to win the complete range of Americana budget software for the Spectrum released so far.

US Gold, who specialise in converting some of the best American software onto our own humble British micros, recently plunged into the budget software market with the release of their Americana label. So far, there have been five Spectrum titles released on the Americana label, including the formerly full-priced Incredible Hulk, and the new game Tremor, which just happened to get our Monster Hit rating this month. And the other games aren't that bad either!

So, if you'd like to get your hands on the complete Speccy Americana range, just read on...

U.S. GOLD

...have given us ten sets of the five Spectrum games: Incredible Hulk, Tremor, Secret of Levitation, Pud Pud and Subterranean Nightmare.

And, as they're all Americana games we thought we'd try and come up with a suitably American competition (and anybody who spoils things be telling us that these games aren't all from America is automatically disqualified!). On this page are pictures of five famous Americans. All you've got to do is tell us their names. Write the names on the coupon provided, and send it to: Americana Competition, ZX Computing Monthly, 1 Golden Square, London W1R 3AB.

Entries must arrive by first post on the 3rd October 1986, and our All-American Editor's decision is final. Please remember to write the five names on the back of your envelope.









Americana Competition

The five famous Americans are:

1) ....

2) ....

3) ....

4) ....

5) ....

Name ....

Address ....

....

....

Complete this coupon and send it to: Americana Competition, ZX Computing Monthly, 1 Golden Square, London W1R 3AB. Entries should arrive by first post on 3rd October 1986.

INLAY ART

What do Soft Aid, Way of the Exploding Fist, Zombie Zombie and Spin Dizzy all have in common? The answer's on the inlay as the covers were all created by David Rowe. ZX talks to one of the software industry's busiest artists.

No matter how small your games collection the chances are that you already possess one or more cassette covers designed by David Rowe. Since 1982 David has provided original paintings for over 200 covers and he remains among a small group of artists relied upon by the software houses to grab the buyer's eye when browsing through the software shelves.

Commercial artists working in the software field can forget about posterity as the success or failure of their work is judged in an instant.

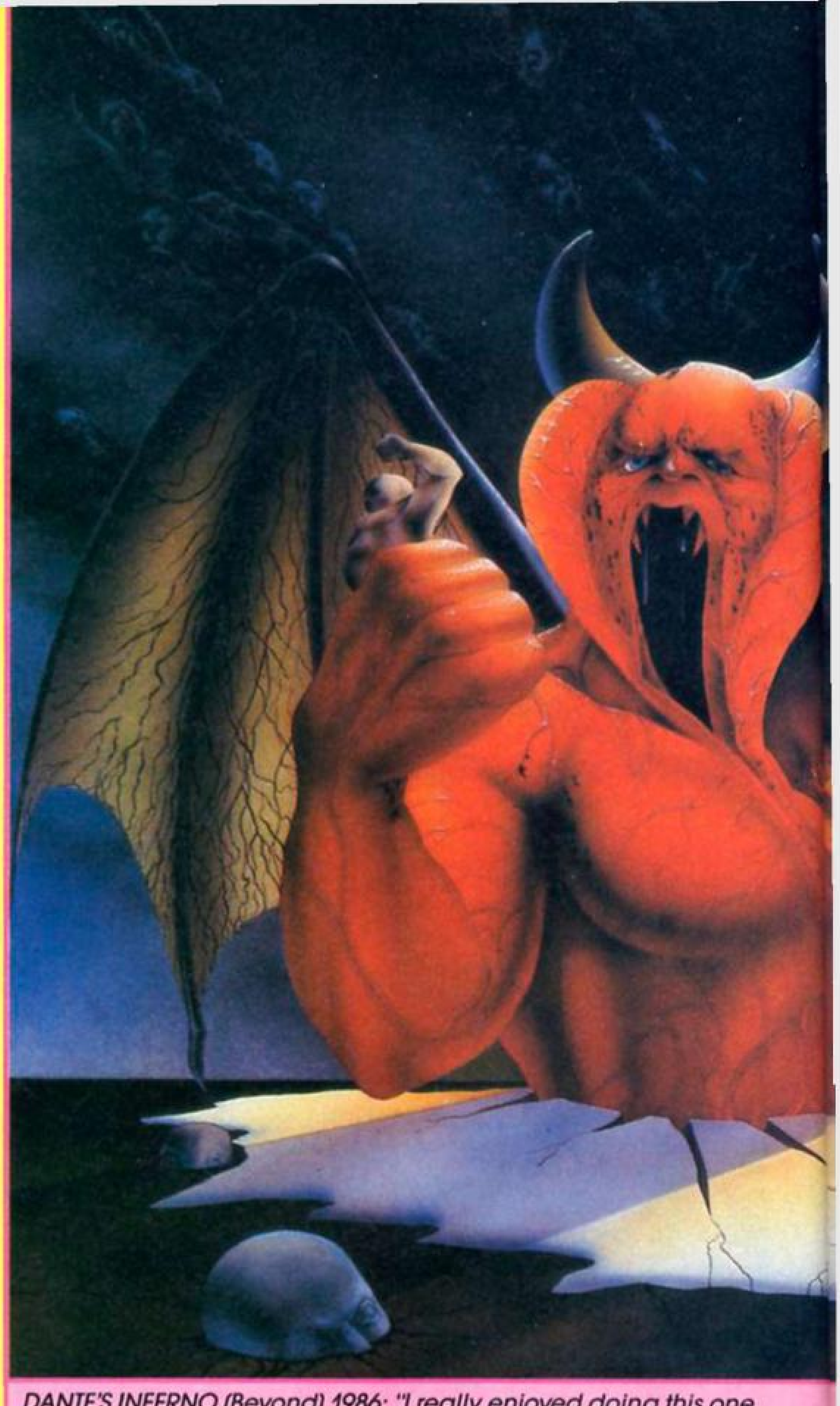
"The artwork has got a job to do and it lasts about a second when someone is looking around the shop. The picture is functional rather than just sitting around and looking pretty. It has to capture the essence of a game and put it across immediately. It's got to scream at people."

David was teaching a life drawing class when he got his first brief to design a cover and since then it has become a major part of his work as a commercial artist. For David, the appeal of games covers is that they constantly call on him to tackle new subjects and use different techniques and styles to create the right effect. And with so many games jostling for the gameplayer's attention, finding that eyecatching effect is becoming increasingly harder.

"Undoubtedly the ideas and treatment of them are becoming far more sophisticated. The days are gone when gamesplayers were satisfied with a chunky spaceship on the cover. There are more bizarre requests these days, such as for Schizophrenia where I was asked to come up with computers that looked as if they had been designed in the Victorian era. It's all a bit different from coming up with something for Frogger."

Versatility

Versatility is essential for the artist who wants to remain in business. David provided the artwork for the Off The Hook



DANTE'S INFERNO (Beyond) 1986: "I really enjoyed doing this one as it gave me the chance to do a mythical beast. Rather than the traditional devil figure I decided to give him raised flanges at the side of the face, a really threatening set of red bulbous growths that look as if they could swell up menacingly at any moment. If you look carefully you can see lost souls floating in the background darkness."



compilation. All proceeds went to help those with drug problems and David chose to express the idea behind Off The Hook by not resorting to clichéd imagery.

"Showing needles and blood would have been so obvious so I tried to depict a character trying to escape from swirling smoke that was dragging him back." The approach required was a far cry from the cartoon style used by David for the forthcoming Electric Dreams game Hijack.

Software houses differ in the way they brief an artist to produce a cover.

"Sometimes a software house will take me through the entire game and there will be a



STING 64 (Quicksilva) 1983: "This was a period when games were pouring onto the market and cover art was needed really quickly. This one was done practically overnight and the honeycomb background is actually a rubbing from the lino behind the bar at the Bunch of Grapes pub in Bishop's Waltham."



SOFT AID 1985: "It turned out to be a pretty controversial cover as some people objected to it being shown at the point of sale. My feeling was that those concerned were their own best spokesmen and that no one was profiting from it. It had to be an effective cover to help the people who needed to benefit."

meeting to suggest the best approach. After that it's time for pretty intensive drawing and airbrushing to produce a full size work. That can take about three days, but of course with pressing deadlines you have to be prepared to work through the night to finish work."

In the Rowe household in Bishop's Waltham, Hampshire, the studio is seldom unoccupied as David's wife Susan is also a well known artist whose delicate, fairytale style has graced the covers of such games as Wizardry.

"We take it in turns to look after our two children and it's enormously helpful as you can get too close to the picture and a fresh eye is sometimes necessary to convince you that what you worked on the night before stands up in the morning light."

After doing so many games covers what spurs him on to tackle the next brief?

"I suppose it's the fact that I'm never fully satisfied and I always hope that the next one will be better than the last."



Part three: Toni Baker looks at some calculator instructions.

As I have already stated, the sequence of instructions between RST 28 and "end-calc" constitutes a 'Calculator Program', written in a language called 'Calculator Code', but no language would be complete without controlling instructions: IF/THEN's; GOTO's; FOR/NEXT's and so on. These things we shall now turn our attention to.

Jump!

The first control instruction you need to know about is the calculator equivalent to GOTO – called "jump". It takes two bytes – the first byte is hex 33, which means "jump", and the second byte is the relative jump displacement, counted from this second byte. Notice that although the instruction is very similar in operation to the machine code JR instruction, the displacement is counted from a different point. In machine code, JR 00 jumps to the next instruction (and hence achieves nothing except to spend time). In calculator code, however, you would need to use "jump 01" to do this. In machine code JR -2 would be an infinite loop; in calculator code, "jump -1" would be an infinite loop; and so on.

Labels may of course be used in calculator code just as in machine code. This means that you don't have to actually include the jump displacement in the listing, you can just write "jump LABEL" (or whatever), and have a separate instruction labelled LABEL elsewhere in the program.

Calculator jumps are *always* relative. They can be either forward or backward, but each jump has a maximum range of 128 bytes. Forward jumps have displacement bytes from 01 to 7F (1 to 127), whereas backward jumps have displacement bytes 80 to FF (–128d to –1), though do remember of course that the displacements are counted from a different point from what you're used to in machine code.

IF . . . THEN

Next we come to the calculator equivalent of IF/THEN. There are two parts of an IF/THEN statement in BASIC. There's the condition which we test (the bit between IF and THEN) and this can either be TRUE or FALSE. Then there's the action (the bit after THEN) which is executed only if the condition was TRUE. In calculator code we can actually achieve all that very simply, and to just about anything we can do in BASIC (in an IF/THEN statement, that is). The only restriction we have to put up with is the *action* part of the statement, which in BASIC can be any statement whatsoever. In calculator code, only "jump" instructions are allowed. This means that we are allowed the equivalent of IF/THEN GOTO, instead of IF/THEN anything; – but that's not really a constraint, since all you have to do is structure the program differently and you can still get away with anything.

What about the condition part? Well, the calculator instruction in question is called "jump-true". Like "jump" it is two bytes long. The first byte is 00, and the second byte is a jump displacement, which is counted in exactly the same way as "jump", described earlier. How it works is this: "jump-true" removes one item from the top of the calculator stack – the item is effectively deleted – IF this item was TRUE (ie non-zero) then the jump is taken; IF the item was FALSE (ie zero) then the jump is *not* taken, and the displacement byte is ignored.

This idea of using non-zero values to mean TRUE, and zero to mean FALSE is more than just a convenient way of doing things – it is fundamental to Spectrum logic. In fact you could even go so far as to say that TRUE and FALSE are themselves data-types, being neither numbers nor strings, but a new *kind* of data-type called a LOGICAL quantity.

Figure 1

CODE	INSTR	BEFORE	AFTER	CORRUPTS	COMMENTS
00ee	jump true	x			jump if x is true.
01	exchange	x,y	y,x		
02	delete	x			
03	subtract	x,y	x-y		
04	multiply	x,y	x*y		
05	divide	x,y	x/y		
06	power	x,y	x↑y	B,M0-M3	
07	or	x,y	x OR y		
08	n_and	x,y	x AND y		
09	n_le	x,y	x<=y		B must equal 09.
0A	n_ge	x,y	x>=y		B must equal 0A.
0B	n_ne	x,y	x<>y		B must equal 0B.
0C	n_gt	x,y	x>y		B must equal 0C.
0D	n_lt	x,y	x<y		B must equal 0D.
0E	n_eq	x,y	x=y		B must equal 0E.
0F	add	x,y	x+y		
10	s_and	x$,y	x$ AND y		
11	s_le	x$,y$	x$<=y$		B must equal 11.
12	s_ge	x$,y$	x$>=y$		B must equal 12.
13	s_ne	x$,y$	x$<>y$		B must equal 13.
14	s_gt	x$,y$	x$>y$		B must equal 14.
15	s_lt	x$,y$	x$<y$		B must equal 15.
16	s_eq	x$,y$	x$=y$		B must equal 16.
17	s_add	x$,y$	x$+y$		
18	val$	x$	VAL$ x$		B must equal 18.
19	usr_s	x$	USR x$		
1A	read_in	x	INKEY$#x		
1B	negate	x	-x		
1C	code	x$	CODE x$		
1D	val	x$	VAL x$		B must equal 1D.
1E	len	x$	LEN x$		
1F	sin	x	SIN x	B,M0-M2	
20	cos	x	COS x	B,M0-M2	
21	tan	x	TAN x	B,M0-M2	
22	asn	x	ASN x	B,M0-M2	
23	acs	x	ACS x	B,M0-M2	
24	atn	x	ATN x	B,M0-M2	
25	ln	x	LN x	B,M0-M2	
26	exp	x	EXP x	B,M0-M3	
27	int	x	INT x	M0	
28	sqr	x	SQR x	B,M0-M3	
29	sgn	x	SGN x		
2A	abs	x	ABS x		
2B	peek	x	PEEK x		
2C	in	x	IN x		
2D	usr_n	x	USR x	?	
2E	str$	x	STR$ x	M0-M5	(MEM) must equal MEMBOT.
2F	chr$	x	CHR$ x		
30	eq_z	x	x=0		TRUE if x=0; FALSE otherwise.
30	not	x	NOT x		TRUE becomes FALSE & vice versa.
31	duplicate	x	x,x		
32	mod,div	x,y	x-y*INT(x/y), INT(x/y)	M0	Will not work if x negative.
33ee	jump				Jump by displacement ee.
34	stk data		x		Byte 34 must be followed by the value x in compressed form.
35ee	djnz				B:= B-1. Jump unless B=0.
36	lt_z	x	x<0		TRUE if x<0; FALSE otherwise.
37	gt_z	x	x>0		TRUE if x>0; FALSE otherwise.
38	end calc				Switch off calculator.
39	get argt	x	2*ASN SIN x/PI	M0	See figure three.
3A	truncate	x	SGN x*INT ABS x		
3B	execute B				Execute calc instr in B reg.
3C	e to fp	x	?		Doesn't work because of bug.
3D	restack	x	x		Restack in floating point form.
8n	series n	x	$P_n(x)$	B,M0-M2	Evaluate Tchebyshev polynomial
9n	series n+10h	x	$P_{n+10h}(x)$	B,M0-M2	(See Part 5 of this series).
A0	const zero		0		
A1	const one		1		
A2	const half		0.5		
A3	const pi/2		1.5707963269		
A4	const ten		10		
Cn	store Mn	x	x		Store x in memory n. (M6-M1F not
Dn	store M(n+10h)	x	x		possible if (MEM) = MEMBOT.)
En	recall Mn		Mn		M6 to M1F not possible
Fn	recall M(n+10h)		M(n+10h)		if (MEM) = MEMBOT.

Let me give you an example of this. The calculaotr instruction "lt_z" (less than zero) replaces the topmost item o the calculator stack by either TRUE (if this was a negative number) or FALSE (otherwise). A second example: the instruction "not" replaces TRUE by FALSE, and FALSE by TRUE. This kind of thinking, rather than making things ever more complicated, actually simplifies things immensely.

The calculator instruction "not", when viewed in this light, now has a double meaning. If the item at the top of the stack is a logical quantity (either TRUE or FALSE) then it will change TRUE to FALSE and vice versa; but if on the other hand the item at the top of the calculator stack is a number then you can think of the instruction as being "equals_zero", whereby the number is removed from the stack, and replaced by TRUE if the number equals zero, of FALSE if it doesn't. In fact, this identity between "not" and "equals zero" carries right through to BASIC. IF NOT (anything) is exactly the same as IF 0=(anything). Try it if you don't believe me. Similarly you can replace all of your IF (anything) 0 THEN statements by simply IF (anything) THEN. But we digress — back to the calculator . . .

And AND

There are two instructions for AND. "n_and" works with logical quantities in a very straightforward way: TRUE AND TRUE equals TRUE; TRUE AND FALSE equals FALSE; and so on. It can also be used in the form "number AND logical". We can do this in BASIC, for instance, as in the expression (7 and (X>9)) — whereby the number is replaced by zero if the logical quantity is FALSE. The second AND instruction is "s_and", for which the two items at the top of the stack must be a string followed by a logical value. The logical quantity is deleted from the stack, and the string is replaced by the empty string if, and only if, the logical value was FALSE.

OR also applies to logical quantities, and is extremely simple. TRUE OR TRUE equals TRUE; TURE OR FALSE equals FALSE; and so on — it's exactly what you'd expect.

With this understanding of TRUE and FALSE, we can now use the calculator to evaluate an expression which leads to a logical result. In other words, we can produce a value of TRUE or FALSE from an expression. The conditional part of an IF/THEN statement can now be simulated. For instance, take a look at Figure Two. This is part of a calculator program which evaluates the expression "X = 3

Figure 2

		To begin, X is at the top of the calc.stack.
31	duplicate	X,X
3440B00003	stk data 3	X,X,3
03	subtract	X,X-3
30	equals zero	X,X=3
01	exchange	X=3,X
3440B00005	stk data 5	X=3,X,5
03	subtract	X=3,X-5
37	gt zero	X=3,X>5
07	or	X=3 OR X>5
00xx	jump true	jump if X=3 OR X>5.

OR X > 5" — in other words it produces a value of TRUE if X equals three, or if X is greater than five (X is assumed here to mean the value at the top of the calculator stack). Once the condition is simulated we can follow this by a "jump-true" instruction, and our IF/THEN construction is now complete.

Although a FOR/NEXT type construction could be built using the calculator memories and the IF/THEN construction, there is a built-in structure which may be useful here. The calculator instruction "djnz". But before we can cover the use of this instruction, we must first examine the concept of the calculator's B register.

Registers

Machine code has loads and loads of registers. The calculator has but one. This is the calculator's 'B' register, which can store a value of between zero and 255d.

When the calculator is switched on, by use of the machine code instruction RST 28, the value of the B register is automatically carried through from machine code. This means that whatever B contained prior to RST 28, the calculator's B register will contain immediately *after* RST 28. similarly, when the calculator is switched off, by the calculator instruction "end-calc", the value of the B register is again carried through — whatever the calculator B regiser contained before "end-calc", then the machine code B register will contain this value after "end-calc". Furthermore, the value which the calculator B register contained whilst "end-calc" was being executed will in addition be stored in the system variable B_REG.

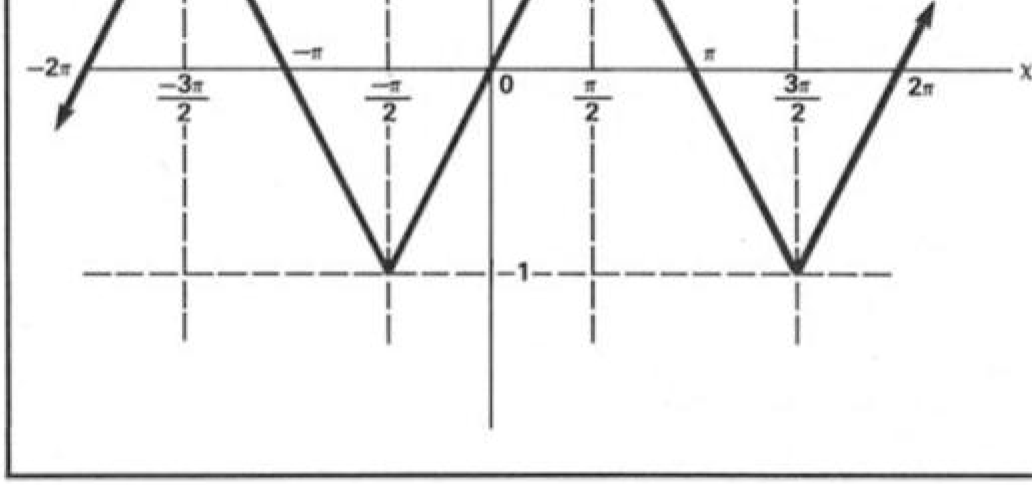
There is a calculator instruction called "execute-B". This assumes that B contains a calculator code value (eg OF for "add", or 03 for "subtract", etcetera). Its purpose is to execute the calculator instruction indicated. The instruction sequence RST 28/"execute-B"/"end-calc" will therefore execute any desired calculator instruction from machine code. Obviously this will only work for single-byte calculator instructions. This instruction sequence actually occurs in the ROM at address 2756h, and is a key element in evaluating BASIC expressions.

B Register Dependent Instructions

There are many calculator instructions which actually depend upon the value of the B register in order to work. The most notable and important of these are the conditional operators: =, <, >, <=, >=, and <>. Figure One contains a list of all calculator instructions, and their codes. Some instructions, which are commented upon in Figure One, willot work correctly unless B contains the code of the instruction. For instance, the instruction "n_less_than" compares the two topmost items on the stack, which must be numeric (note that "s_less_than" can be used for string items) and will delete both items from the stack, replacing them with TRUE if the first was less than the second, FALSE otherwise. The code of this instruction is OD. *This instruction will not work correctly unless B contains hex OD!* It is not practical to assign the B register from calculator code, so the only really sensible way of using "n_less_than" would be to use the instruction sequence "end calc"/LD B,OD/RST 28/"n_less_than".

Similarly, "s_equal", which tests whether two strings are equal, will not work unless B contains 16h (since the code of "s_equal" is 16h). There are a number of instructions which fall into this trap, so beware of them.

Figure 3



B Register Altering Instructions

There are, in addition, many calculator instructions which corrupt the B register. For instance, after execution of the instruction "sin" (which calculates the sine of the topmost number on the stack) the B register will always contain zero. Figure One also illustrates which of the instructions wull corrupt the B register.

DJNZ

We have now looked at the B register in great detail. With this knowledge we can look at the calculator "djnz" instruction. Like "jump" and "jump true" this is a two byte instruction. The first byte is always 35h. The second byte is a jump displacement, which is counted in exactly the same way as for "jump". The effect of the instruction is to decrement the B register. If, after being decremented, B contains zero, then the jump is taken — otherwise the jump is not taken and the displacement byte is ignored.

The STK-DATA INSTRUCTION

The "stk data" instruction which was demonstrated in Figure Two is also very easy to use. It can be used to stack either strings or nubers onto the calculator stack without having to leave the calculator. The exact format of the instruction code depends upon what you want to stack, and the rules are as follows:

Integers between zero and 255d:
"stk data nn" (with nn being an integer between 00 and FF) has hex code format 34 40 BO 00 nn.

Integers between zero and 65535d:

"stk data mmnn" (with mmnn being a positive integer between 0000 and FFFF) has hex code format 34 80 BO 00 nn mm.

Negative integers between −65535d and −1:

Writing −1 as FFFF, −2 as FFFE, and so on, the format is 34 80 BO FF nn mm (If you can't work out how to write the negative numbers in hex just add 65536d to the negative number, and write the result in hex).

The empty string:

to stack the empty string don't bother to use "stk data" at all. The instruction "const zero" (code AO) will stack the number zero at the top of the calculator stack. This is equivalent to the empty string (although the reverse is not necessarily true).

Strings less than 256d bytes long:

With the text of the string stored at some fixed address in memory (ppqq, say), if the length of the string is nn, you can stack the string using the code format 34 BO qq pp nn.

Strings of any length:

If the address of the string is ppqq, and the length of the string is mmnn, then you can stack the string with the "stk data" code format 34 FO qq pp nn mm.

All other numbers:

Well, step one is to convert the number into floating point form. The mechanism for doing this was explained in part one of this series. Suppose the normal five byte form is "aa ee dd cc bb" (with aa representing the first bute, ee the second, and so on). Now everthing depends upon the value of aa. There are two cases to consider. Firstly, if the byte is in the range 51 to 8F then you should refer to the table of Figure Four. Just select whichever of the four forms uses the least bytes. You have to calculate aa* according to which of the four forms you require. The second case is when aa falls outside the range 51 to 8F. In this case you should refer to Figure Five, and as before you just select which of the four forms uses the least bytes. You still have to calculate aa*, but in this case you simply subtract 50h from aa for all forms, instead of having a different rule for each form.

Miscellaneous Instructions

It is the purpose of this month's article to cover *all* of the calculator instructions (except one, but more of that later), other than those already covered of course. For this reason I now present some miscellaneous trivia about those remaining calculator instructions which don't really fall into any pattern.

There is a calculator instruction called "read in", which evaluates INKEY$ X (assuming X is the number at the top of the calculator stack). Now the Spectrum is a machine of very many bugs, and it's worth pointing out that the same bug which you find in BASIC is also present in the calculator. The action of "read in" is twofold. Firstly, stream X is selected as the current stream, and then an attempt is made to input a single character from this stream. If the attempt fails then the empty string is returned. The bug occurs when X is zero or one. Streams zero and one both select channel "K" — the keyboard. Thus, firstly, channel "K" is selected — this causes bit five of (FLAGS) to be reset, signalling "ready for a new key". This is the bug, for immediately after this an attempt is made to input a character from channel "K", via the subroutine at address 10A8. In the subroutine bit five of (FLAGS) is tested, and control returns immediately (indicating failure to detect a key) if this bit is reset. Therefore — INKEY$ # 0 will almost invariably return the empty string — the only exception to this being the very rare circumstance whereby an interrupt occurs between the resetting and the testing of the flags bit, and then only is a *new* key is detected at that point (courtesy of the repeat facility). INKEY$ # 0, which *could* have been extremely useful, has been made completely useless by a pretty stupid bug.

"argt" is a rather strange function. It returns (2/PI)*ASN (SIN(X)). It's pretty useless as far as you or I are concerned. It is used by the ROM to help it calculate SIN and COS. Figure Three shows argt(X) diagrammatically.

"truncate" could be useful, however. It's a bit like INT, except that whereas INT always truncates *downwards*, "truncate" will truncate *towards zero*. Thus "truncate" literally removes everything to the right of the decimal point, whether the number is positive or negative. It is in fact equivalent to SGN(X)*INT(ABS(X)).

"e to fp" is completely and utterly useless, due to a bug even more stupid than the one in "read-in". Its purpose is to calculate X*10 ↑ A, where X is the number at the top of the calculator stack, and A is the ordinary machine code A register (which may contain either a positive or a negative number). The problem is that when RST 28, or any of the calculator instructions, is executed, the A register is corrupted, making it completely impossible to use this function! (Note: You can however use CALL 2D4F to use this subroutine from machine code).

"restack" can be thought of as the opposite of INT. Whereas INT converts all numbers to integers, "restack" converts all numbers to floating point numbers. You may recall that the number four (for example) is stored in five byte form as 00 00 04 00 00. It may, however, also be stored as 83 00 00 00 00, since this is the floating point form of the number. All small inegers (except zero) may be written in full floating point form, with the first byte containing the exponent, and the remaining

Figure 4

To stack a number where the first byte is in the range 51 to 8F:

Five byte form	Calculator code	Meaning of aa*	Possible range of aa*
aa ee 00 00 00	34 aa* ee	aa - 50h	01 to 3F
aa ee dd 00 00	34 aa* ee dd	aa - 10h	41 to 7F
aa ee dd cc 00	34 aa* ee dd cc	aa + 30h	81 to BF
aa ee dd cc bb	34 aa* ee dd cc bb	aa + 70h	C1 to FF

To stack a number where the first byte is in the range 00 to 50, or 90 to FF:

Five byte form	Calculator code
aa ee 00 00 00	34 00 aa* ee
aa ee dd 00 00	34 40 aa* ee dd
aa ee dd cc 00	34 80 aa* ee dd cc
aa ee dd cc bb	34 C0 aa* ee dd cc bb

where aa* = aa - 50h.

Figure 5

bytes the mantissa. Zero remains unchanged as 00 00 00 00 00. You can use "restack" in BASIC — to restack the variable N just use LET N = (N/2)*2.

There are thirty two "series" instructions, with codes from 80 to 9F. Their action is too involved for me to cover in one small paragraph, so I'll save that one until part five (the final part) of this series.

Communicating with BASIC

Well that covers all of the calculator instructions, but it's not *all* that the calculator can do. It can be much more powerful, even than we have seen so far.

There are many questions still unanswered. How do you get random numbers (the RND function)? How can you calculate SCREEN$(X,Y)? How do you read the value of a BASIC variable? How do you slice a string? These questions, and many more, will soon be answered. To be continued . . .

SHORT CUTS

There has been a tremendous response to our challenge of writing an interesting compact program. The competition is hotting up and remember there are £10 prizes for each published program plus £20 for the outstanding Star-cut of the month.

A trio of characters

The first Contender this month is Ben Stagnell, 13, of Radway, who sent us three variations on a program to create new character sets.

Now I don't know about you, but I never bothered to alter my chars in programs because the effort of either typing in at least 52x8 sets of data to individually create a new char. set or to modify each letter using a char. definer program was just too time consuming.

Ben's programs cleverly make modifications to the existing set after coyping them to ROM. This makes each variation short, fast and easy to use.

All 96 characters are modified and once you type in the program run it and save it when instructed you are ready to go. To see the effect type **POKE 23606,0: POKE 23607, 117** and all printing to the screen will be in that font.

Now as it stands the code of each new character set is located at 30208 which does not give a lot of room for anything else, however the code can be loaded into any area of memory as long as you follow the next instructions:

1. CLEAR to the address one less than the code will be loaded to i.e. to load it to **64000, Clear 63999**

2. Type or include as a program instruction LOAD " " CODE address i.e. **LOAD " " CODE 64000**

3. Play the tape with the program code on it.

4. Type or include as program lines **POKE 23606, address-256*INT (address/256): POKE 23607, INT (address/256)** i.e "address" would be replaced by 64000 for the general usefulness of these routines, Ben wins the £20 Star-Cut prize.

```
   5 REM
  10 REM * DOUBLE THICKNESS *
  20 REM
  30 FOR n=30000 TO 30029: READ
a: POKE n,a: NEXT n
  40 DATA 33,0,61,17,0,118,1,0,3
,237,176,33,0,118,17,0,3,126,79,
203,63,177,119,35,27,122,179,200
,24,243
  50 RANDOMIZE USR 30000
  60 INPUT "Name to save > "; LI
NE n$
  70 CLS : PRINT "Saving :";n$
  80 SAVE n$CODE 30208,768
  90 PRINT ''"Rewind tape to ver
ify"
 100 VERIFY n$CODE
 110 BEEP .1,10: PRINT "Save com
plete"
 120 NEW
```

```
   5 REM
  10 REM * ITALICS *
  20 REM
  30 FOR n=30000 TO 30041: READ
a: POKE n,a: NEXT n
  40 DATA 33,0,61,17,0,118,1,0,3
,237,176,33,0,118,14,96,6,2,126,
203,63,203,63,119,35,16,247,6,4,
126,203,63,119,35,16,249,35,35,1
3,200,24,230
  50 RANDOMIZE USR 30000
  60 INPUT "Name to save > "; LI
NE n$
  70 CLS : PRINT "Saving :";n$
  80 SAVE n$CODE 30208,768
  90 PRINT ''"Rewind tape to ver
ify"
 100 VERIFY n$CODE
 110 BEEP .1,10: PRINT "Save com
plete"
 120 NEW
```

```
   5 REM
  10 REM * FUTURISTIC *
  20 REM
  30 FOR n=30000 TO 30035: READ
a: POKE n,a: NEXT n
  40 DATA 33,0,61,17,0,118,1,0,3
,237,176,33,0,118,6,96,197,35,35
,35,35,6,4,126,79,203,63,177,119
,35,16,247,193,16,237,201
  50 RANDOMIZE USR 30000
  60 INPUT "Name to save > "; LI
NE n$
  70 CLS : PRINT "Saving :";n$
  80 SAVE n$CODE 30208,768
  90 PRINT ''"Rewind tape to ver
ify"
 100 VERIFY n$CODE
 110 BEEP .1,10: PRINT "Save com
plete"
 120 NEW
```

Maths mad

There is a great deal of interest in mathematical functions in computing and W. E. Thomson sent us this routine to factorise numbers (maths students everywhere take note!).

There is a time delay which depends on the complexity of the number, the prime 4294967291 will take around 8 minutes to check, most other numbers far less!

Note the use of the subroutine at 300, it prints all the digits of a nine or ten character integer unlike the built in PRINT command which rounds off at 8 digits.

```
  10 REM factorise
  20 DATA 2,1,2,2,4
  30 DATA 2,4,2,4,6,2,6,4,2,4,6,
6,2,6,4,2,6,4,6,8,4,2,4,2,4,8,6,
4,6,2,4,6,2,6,6,4,2,4,6,2,6,4,2,
4,2,10,2,10
  40 RESTORE 20
  50 INPUT "Input a number<=4294
967296:                       ";n
  60 GO SUB 300
  70 LET f=0: LET d=0
  80 FOR b=0 TO 52: READ z: LET
d=d+z
 100 LET q=n/d: IF q<d THEN  GO
TO 200
 110 IF q=INT q THEN  PRINT "="
AND NOT f;d;"*";: LET f=1: LET n
=q: GO TO 100
 120 NEXT b
 130 RESTORE 30: LET b=4: NEXT b
 200 IF NOT f THEN  PRINT " is p
rime";
 210 IF f THEN  GO SUB 300
 220 PRINT : GO TO 40
 300 LET h=INT (n/1e5)
 310 IF NOT h THEN  PRINT n;: RE
TURN
 320 PRINT h;(STR$ (n-1e5*(h-1))
)(2 TO );: RETURN
```

ELEMENTARY GRAPHICS

Toni Baker rounds off her machine code graphics series.

This is the third and final part of my Elementary Graphics series In this article I intend to go through all of the BASIC commands and functions which have anything to do with graphics, and tell you how to do them in machine code. This is actually extremely easy, since the majority of commands etc can be performed simply by calling a machine code subroutine. In many ways, though, machine code is more poweful than BASIC, simply because it can do more. I shall therefore show you how to perform *variations* on BASIC commands, which you cannot achieve in BASIC.

CLS

The first task we'll look at is clearing the screen. In BASIC this is achieved by making use of the CLS command. In machine code we have quite a few options, the easiest and simplest way being to simply call the subroutine CLS at address OD6B. This works exactly like the BASIC CLS. It is also possible to clear the lower part of the screen only — normally this will be the bottom two lines, but you could make it more. Calling LCS_LOWER at address OD6E will achieve this. Don't forget that the lower screen will be cleared in the border colour, not the screen colours.

We have an even more useful option available to us, however. There is a subroutine in the ROM called CL_LINE at address OE44. To use this subroutine the B register must contain a number between 01 and 18h. The action of the subroutine is to clear the bottom 'B' lines of the screen. For instance, to clear the lowest ten lines of the screen it is only necessary to load B with OAh and call CL_LINE. You can use CL_LINE in one of two ways. If bit zero of the system variable (TVFLAG) is reset then the screen colours will be used, otherwise the border colour will be used. It is therefore possible to clear the entire screen (i.e. including the bottom two lines) in the screen colours — this would not have been possible using CLS! You should note, however, that CLS will restore the print position to the start of the screen, whereas CL_LINE will not.

Scrolling the screen

When you attempt to print something beyond the last available print position, then the message "scroll?" appears at the bottom of the screen and you are expected to press "y" or "n" (although in practice any key will do). Pressing "n" gives you an error message, whereas "y" will allow the screen to scroll. Subsequent attempts to print beyond the end of the screen will cause the screen to scroll automatically, until everything on the screen is new (i.e. until everything which was displayed at the last "scroll?" has disappeared off the top of the screen). This type of scrolling is built in, and will occur in both BASIC and machine code. We may therefore refer to it as "automatic" scrolling.

But "manual" scrolling is also possible. Calling the subroutine SCROLL at address ODFE will scroll the entire screen, but with some unexpected effects: firstly the current print position will be *unchanged* — you must deal with this by hand; secondly, the first line of the lower screen is not blank, or is a different colour to the permanent upper screen colours, then the result may not be what you desired.

The second way of producing manual scrolling is even more impressive. The subroutine CL_SCROLL at address OEOO is designed to scroll only part of the screen. The B register must contain the number of lines to be moved by the scroll (i.e. one less than the number of lines affected). A minimum of two lines must be scrolled — if only the minimum is used then B must contain 01 — the effect will be to transfer the bottom line to the penultimate line, and then to blank the bottom line. With B greater than one, any number of lines may be scrolled, up to and including the full screen (for which B must equal 17h). The general effect of CL_SCROLL is therefore to transfer the bottom 'B' lines of the screen upward one line, and then to blank the bottom line. B must be in the range 01 to 17h.

Dumping the screen to a printer

COPY is a rather strange command on the Spectrum. On the 16K or 48K version of the Spectrum it will dump a copy of the screen onto the ZX Printer, if one is present. This will also be the case for the 128K version in 48K mode. The Spectrum 128 in 128K mode, however, will dump a copy of the screen onto any Epson compatable printer via the built in RS232 interface. How can we cope with both of these possibilities in machine code?

The subroutine COPY at address OEAC will dump the

screen onto the ZX printer. Note that this subroutine must *not* be used with the Spectrum 128 in 128K mode, since to do so would invariably cause a crash.

It is possible, however, to write a machine code program to COPY the screen onto the ZX printer which *will* work on the Spectrum 128 in 128K mode. The trick is to avoid erasing the printer buffer, as it is this which causes the crash. Such a program is included as Figure One — it might even save you money because now you don't have to go out and buy a 'proper' printer — the ZX one can be used again!

Spectrum 128 owners might also be interested to hear that their own particular version of COPY (i.e. to dump the screen onto an Epson compatible printer via the RS232) is also available from machine code. The program in Figure Two will achieve this. Notice its extreme simplicity! It will work on *all* Spectrum 128s, even if Uncle Clive decides to change the ROM, because COPY_VECTOR is a vector address which will be available on all versions of the 128 ROM.

It is also possible to COPY just one part of the screen to the ZX printer. You can COPY any chunk of screen, from the bottom, the top, or anywhere out of the middle. Furthermore you are not even restricted to using whole character squares — the section to be copied can both begin and end in the middle of a character square is you wish! Your only restriction is that you must copy the full width of the screen, even though you don't have to copy the full height. To achieve this, HL must point to the first screen byte to be copied (i.e. the byte in the top left hand corner of the chunk to be copied, which must be at the left edge of the screen). In addition, B must contain the height of the block to be copied, when measured in pixels (i.e. B must contain eight times the number of character squares in the height of the chunk). Then *either* (1) disable interrupts and then call COPY_1 at address OEB2 — note that interrupts will be enabled upon return (16K or 48K Spectrum, or Spectrum 128 in 48K mode), *or* (2) call the label 128COPY_1 in the program in Figure One.

Pause

The BASIC PAUSE statement may easily be simulated in machine code. All you really have to do is to load BC with the number of frames for which you wish to pause (there are fifty frames every second) and then simply call PAUSE_1 at address 1F3D. Note that if BC is instead loaded with zero then you simulate PAUSE 0: which will remain paused forever (or until a key is pressed). This could be quite useful in graphics.

It is also possible to PAUSE for a precise number of frames *without* the possibility of the PAUSE being terminated by pressing a key. Figure Three shows a program for just this purpose. Simply load BC with the required number of frames before calling the subroutine.

Plotting points

There are two ways to PLOT points in machine code. The first, and simplest, method is to load

FIGURE ONE

Program to dump the screen onto a ZX printer. Will work on 128K Spectrum.

```
06B0      128COPY     LD B,B0          B:= number of pixel rows to be copied.
110040                LD HL,4000       HL:= address of first row to copy.
F3        128COPY_1   DI
C5        C_LOOP_1    PUSH BC
E5                    PUSH HL
78                    LD A,B           A:= number of rows remaining.
FE03                  CP 03
9F                    SBC A,A
E602                  AND 02           Set bit one for the last two rows.
D3FB                  OUT (FB),A       Slow printer motor for last two rows.
57                    LD D,A           D contains "last two rows" flag.
CD541F    C_LOOP_2    CALL BREAK_KEY
3807                  JR C,C_CONT_1    Jump unless BREAK pressed.
3E04                  LD A,04
D3FB                  OUT (FB),A       Switch printer off.
FB                    EI               Re-enable interrupts.
CF0C                  RST 08/DEFB 0C   Exit with report "D, BREAK - CONT repeats".
DBFB      C_CONT_1    IN A,(FB)
CB77                  BIT 6,A
2006                  JR NZ,C_CONT_2   Jump if printer not connected.
17                    RLA
30EB                  JR NC,C_LOOP_2   Wait until printer is ready.
CD120F                CALL COPY_ROW    Copy next row to the printer.
E1        C_CONT_2    POP HL
C1                    POP BC
3E07                  LD A,07
24                    INC H
A4                    AND H
200A                  JR NZ,C_CONT_3   Jump if within same character line.
7D                    LD A,L
C620                  ADD A,20
6F                    LD L,A
3804                  JR C,C_CONT_3    Jump if new screen segment reached.
7C                    LD A,H
D608                  SUB 08
67                    LD H,A
10C9      C_CONT_3    DJNZ C_LOOP_1    HL:= address of next row. Loop till done.
3E04                  LD A,04
D3FB                  OUT (FB),A       Switch printer off.
FB                    EI
C9                    RET
```

FIGURE TWO

Program to dump the screen to Epson compatable printer. Will only work on 128K Spectrum.

```
CD005B    COPY_E      CALL 5B00,SWAP            Page in new ROM.
CD2A01                CALL 012A,COPY_VECTOR     Call new ROM subroutine.
C3005B                JP 5B00,SWAP              Page in old ROM once more.
```

FIGURE THREE

Program to PAUSE for BC frames, without terminating on key depression.

```
78        PAUSE_X     LD A,B
B1                    OR C
C8                    RET Z            Return if PAUSE completed.
0B                    DEC BC           Decrement count.
76                    HALT             PAUSE for one frame.
18F9                  JR PAUSE_X       Jump back for next test.
```

C with the x-coordinate, and B with the y-coordinate, and then call the subroutine PLOT_SUB at address 22E5. There is, however, a second method, which might be more suited to calculator enthusiasts. In this method the two coordinates must be placed at the top of the calculator stack in the order x,y. This being done you simply call the subroutine PLOT at address 22DC. The coordinates will be removed from the stack and the point will be plotted.

Drawing a straight line

In machine code there are essentially two ways of drawing a straight line, but before we look at these it is worth remindng ourselves of the DRAW statement itself. You see, the syntax of the BASIC DRAW statement is DRAW X,Y: but X and Y are *not* screen coordinates — instead they are displacements from the last point plotted. It is these displacements, rather than absolute screen coordinates, which we must use in order to draw a line.

First the simple(ish) method. The X displacement must be stored between registers C and E, with C containing ABS(X), and E containing 01 if X is positive or zero, FF if it's negative. In a similar way the Y displacement must be split between B and D, with B containing ABS(Y) and D containing 01 if Y is positive or zero, FF if it's negative. Once the registers are so arranged, the subroutine DRAW_3 may be called, at address 24BA. This will draw the line, but it will also corrupt HL'. HL' must be reloaded with 2758h before returning to BASIC, or else you'll get a crash.

A second way of drawing a straight line is to have the X and Y displacements at the top of the calculator stack, in the order X,Y. You then merely have to call DRAW_LINE (address 24B7). This will remove X and Y from the stack and then draw the line. Note that this too will corrupt HL', and so you must reload it with 2758 before returning to BASIC.

FIGURE FOUR

Improved SCREEN$ function to detect all types of character.

Call from label SCR_FP if coords are at top of calc stack in order Y,X. Result on stack.

Call from label SCR_FN if used with user defined functions FN S and FN S$.

Call from label SCR_1 if C = y coordinate; B = x coordinate. Result left in A reg with zero flag set for successful search, reset otherwise.

```
CD0723   SCR_FP      CALL 2307,STK_TO_BC      C:= y coord; B:= x coord.
CD????               CALL ????,SCR_1          A:= Screen$(y,x).
010000               LD BC,0000
2003                 JR NZ,SCR_STR            Jump if no match found.
03                   INC BC                   BC:= length of string.
F7                   RST 30                   Create space for string.
12                   LD (DE),A                Assign string with chr found.
C3B22A   SCR_STR     JP 2AB2,STACK_AEDCB      Push onto calc stack and return.

2A0B5C   SCR_FN      LD HL,(DEFADD)           HL: points to function args.
110400               LD DE,0004
19                   ADD HL,DE
4E                   LD C,(HL)                C:= y coordinate.
19                   ADD HL,DE
19                   ADD HL,DE
46                   LD B,(HL)                B:= x coordinate.
CD????               CALL ????,SCR_1          A:= Screen$(y,x).
2801                 JR Z,SCR_SINGLE          Jump if character found.
AF                   XOR A                    Otherwise use zero.
4F       SCR_SINGLE  LD C,A
0600                 LD B,00                  BC:= character found.
C9                   RET

79       SCR_1       LD A,C
0F                   RRCA
0F                   RRCA
0F                   RRCA
E6E0                 AND E0
A8                   XOR B
5F                   LD E,A
79                   LD A,C
E618                 AND 18
EE40                 XOR 40
57                   LD D,A                   DE:= addr of sqr to search.
D5                   PUSH DE                  Stack search address.
2A365C               LD HL,(CHARS)
24                   INC H                    HL points to character set.
CD4D25               CALL 254D,S_SCRN_LP_60   Test for ASCII character.
CDF12B               CALL 2BF1,FP_TO_AEDCB    A:= character found, if any.
```

▶ ▶ ▶

Drawing an arc

In BASIC, the statement DRAW X,Y,A will draw an arc from the last point PLOTed (x1,y1,say) to (X+x1, Y+y1), such that the arc is drawn anticlockwise, and such that the angle subtended by the arc is 'A' radians. To perform this task in machine code the three parameters, X,Y and A must be placed, in that order, at the top of the calculator stack. The subroutine DRAW_ARC may then be called, at address 2394, which will draw the arc on the screen as required. Note that HL' is corrupted by this routine, and must be restored to 2758 before you return to BASIC.

Drawing a circle

To draw a circle, the X and Y coordinates of the centre of the proposed circle must be placed at the top of the calculator stack, followed by the radius. You must then call DRAW_CIRCLE, which is at address 232D, and the circle will be drawn. This routine also corrupts HL', so it is important to restore HL' to 2758 before returning to BASIC.

Testing a point on the screen

The function POINT(X,Y) can be fairly easily simulated in machine code. Either with X and Y initially on the calculator stack (in which case you must call POINT_SUB at 22CB), or with C containing the X coordinate and B containing the Y coordinate (in which case you should call POINT_1 at address 22CE). In either case the result will be left at the top of the calculator stack, and will be zero if the point was PAPER, one if the point was INK. Calling the subroutine FP_TO_A as address 2DD5 after having called the point subroutine will transfer the result into the A register.

Testing the colours of a Character Square

The function ATTR(Y,X) can also be esily simulated in machine code. If Y and X are initially on the calculator stack then call S_ATTR_S (address 2580), otherwise C must contain the line number, and B the column number, than call ATTR_1 (address 2583). In either case the result will be left at the top of the calculator stack. Calling FP_TO_A at address 2DD5 after having called the attr subroutine will transfer the result to the A register. The result will be the attribute byte for the given character square.

Testing the contents of a Character Square

The function SCREEN$(Y,X) is used in BASIC to determine which of the ASCII characters (if any) is printed at character square (Y,X). It willnot, however, detect either user defined graphics or the built-in block graphics. Furthermore, the Spectrum, being a machine of very many bugs, makes a complete mess of the calculator stack whenever SCREEN$ is used in BASIC, with the result that the BASIC statement IF SCREEN$(0,0) = SCREEN$(0,1) THEN PRINT "TRUE" will always yield TRUE irrespective of whether or not it's supposed to. Fortunately this bug is not present in machine code! To use the SCREEN$ function you must call either S_SCRN$_S (address 2535) if the two coordinates are at the top of the calculator stack in the order Y,X; or you must call SCREEN$_1 (address 2538) if C contains the line number and B contains the column number. In either case the string result will be left at the top of the calculator stack. If you then call FP_TO_AEDCB (address 2BF1) then BC will contain zero if no match was found, or one if a match was found, in which case A will contain the character code of the character found, and DE will point to a second copy of A.

Figure Four is an improved version of the SCREEN$ function, which will also detect both user-defined graphics and built-in block graphics.

Well, that concludes this article, and also this series. I have covered the elementary aspects of Spectrum graphics; the basic essentials which you'll need to know before you can progress to more complicated graphics. There will of course be other graphics series in the future, but not straight away. See you next month. May the force be with you ...

```
D1                      POP DE                    DE:= addr of sqr to search.
0D                      DEC C
C8                      RET Z                     Ret if search successful.
D5                      PUSH DE
2A7B5C                  LD HL,(UDG)               HL points to UDG chr set.
0615                    LD B,15                   B:= number of UDG's.
CD4F25                  CALL 254F,S_SCRN_LP       Test for UDG character.
CDF12B                  CALL 2BF1,FP_TO_AEDCB     A:= result - 25h.
C625                    ADD A,25                  A:= character found, if any.
E1                      POP HL                    HL:= addr of sqr to search.
0D                      DEC C
C8                      RET Z                     Return if search successful.
CD????                  CALL ????,TEST_HALF       Test for 1st half of block gr.
C0                      RET NZ                    Ret if search unsuccessful.
4F                      LD C,A                    C:= first half of graphic.
CD????                  CALL ????,TEST_HALF       Test for 2nd half of block gr.
C0                      RET NZ                    Ret if search unsuccessful.
87                      ADD A,A
87                      ADD A,A
81                      ADD A,C
C680                    ADD A,80                  A:= chr code of block graphic.
BF                      CP A                      Set the zero flag.
C9                      RET

CD????    TEST_HALF     CALL ????,TEST_ROW        Test for first row of block gr.
C0                      RET NZ                    Ret if search unsuccessful.
57                      LD D,A                    D:= code for first row.
0603                    LD B,03
CD????    TH_LOOP       CALL ????,TEST_ROW        Test for remaining rows.
C0                      RET NZ                    Ret if search unsuccessful.
BA                      CP D
C0                      RET NZ                    Ret if pixel row different.
10F8                    DJNZ TH_LOOP              Repeat for remaining rows.
C9                      RET
7E        TEST_ROW      LD A,(HL)                 A:= pixel row from screen.
24                      INC H                     HL: points to next row.
1E00                    LD E,00
CD????                  CALL ????,TEST_NIBBLE     Test high nibble.
C0                      RET NZ                    Return if test fails.
CB03                    RLC E                     Bit 0 of E assigned as required.
CD????                  CALL ????,TEST_NIBBLE     Test low nibble.
C0                      RET NZ                    Return if test fails.
7B                      LD A,E
07                      RLCA                      A:= result.
BF                      CP A                      Set zero flag.
C9                      RET

C5        TEST_NIBBLE   PUSH BC
CB13                    RL E
17                      RLA
CB1B                    RR E                      Assign bit 7 of E from A.
0603                    LD B,03
AB        TN_LOOP       XOR E
17                      RLA
3805                    JR C,TN_ABANDON           Abandon test if any bit different.
10FA                    DJNZ TN_LOOP              Repeat test for all bits.
BF                      CP A                      Set zero flag.
1802                    JR TN_EXIT
F6FF      TN_ABANDON    OR FF                     Reset zero flag.
C1        TN_EXIT       POP BC
C9                      RET

DEF FN S(Y,X) = USR SCR_FN
DEF FN S$(Y,X) = CHR$ USR SCR_FN AND USR SCR_FN
```

Brian Beckett with the latest news on the QL.

QL COLUMN

If your QL is feeling lonely and would like to join the wonderful world of computer to computer communications, £80 will now buy you Tandata's full Q-Com package consisting of an intelligent interface, auto-answer/auto-dial module and a modem. This is actually Tandata's third major price cut since Christmas and the package now stands at less than half its original cost. It's an excellent product and — if you do want to put your QL on-line — I would seriously consider picking one up while the going's good as I doubt the price will drop much more unless they start giving them away. *(Well, Micronet are giving away Spectrum modems, so who knows — Ed.)*

This telecommunications bargain may be good news for the off-line public but it shows the sorry state of the QL market at the moment. There's some 100,000 QL owners out there somewhere and Tandata's only major competitor in the communications stakes (the producers of the long-awaited Brightstar modem) has now gone over the brink of insolvency so it seems an odd time to cut Q-Com's price to rock bottom unless the customers just aren't parting with their cash.

Bargains

Speaking of bargains, you can now buy a QL itself for as little as £150 from some of the major high-street retailers — £250 less than it would have cost before things started to go wrong. The burning question is simply "is this a bargain or a low-priced white elephant?" On balance, I think it's a bargain since — for very little money — you get a very good computer with quite a bit of reasonably priced, excellent software available and good peripherals like the Tandata communications package for silly prices. Other peripheral bargains cannot be far away and some clever shopping at computer shows could buy you a very powerful system at a price designed to keep the Bank Manager on friendly terms.

If you are a Spectrum owner looking to expand your system a bit, a cheap QL ought to be a good gamble as you can network the two. You will need to design or find some good software to take full advantage of a Spectrum-QL network but you can pick up a lot of what you need from the program pages of old computer mags. Even forgetting any Spectrum-QL networking, a cheap QL should be seriously considered as, even if Amstrad does the worst and Sir Clive's quantum leap goes gentle into that good night, there is still a fair sized software pool and a reasonable user-base to keep things ticking over for a few years yet. And one never knows: the cavalry may yet arrive in the nick of time and the QL (in some form or other) will see further production runs and consequently lots of new software.

Amstrad

All remains fairly quiet on the Amstrad front. The major QL software and peripheral manufacturers have formed a QL Suppliers' Group to promote the computer's (and thereby their own) future. According to Prospero Software (which issued the press release), the Group's first task is to secure a deal from Amstrad — not exactly a startling revelation — but it seems that the negotiations are going "very well", with hopes for an early agreement. If Prospero's right (and I hope they are), there may well be a breakthrough by the time you read these words of wisdom but, when I rang up Amstrad's PR agency, the gentleman said he would "check with the client and get back to me". I'm still waiting.

In the meantime, Amstrad has made it fairly clear that they would not exactly welcome CST's planned Thor computer based on a QL circuit board and running (hopefully) QL software since it just happens to own the rights thereto. So the saga continues and we will just have to wait and see if we get a nice long and costly legal argument to round things off. After all we've had just about everything else and the lawyers might as well get some fun out of all this along with the rest of us.

Supercharge

If you're thinking about buying Digital Precision's excellent Supercharge QL Basic compiler (£59.95), the latest version (1.19) is available on micro-drive or disc. There have been a lot of useful improvements made to an already very good product, including higher speeds, larger files, added utility programs and a better design for the lenslok security system which — believe it or not — actually allows the user entry on a regular basis. If you already own an earlier Supercharge version, £10 will buy you an up-grade. Supercharge has already had so many nice things said about it that it recommends itself to anyone who is seriously interested in QL programming in Basic and there's little more that I need to add.

Speaking of Supercharge's lenslok, some crafty Belgians have cracked it and are producing pirated copies. So be sure that what you're buying is the real thing. Right now all QL software houses need to know that their products are commercially viable and don't need any more financial disincentives than they already have. Besides, Digital are very nice people and do not deserve to be ripped off. If these altruistic arguments are not enough to offset your baser sense of self-interest, it seems that even the latest efforts from these devious Belgians have not quite cracked the system and runtime is likely to produce some fairly weird results.

Digital's latest effort is Super Media Manager (£39.95) and I had hoped to give it a lengthy lookover but it arrived too late for this month. Briefly and not to keep you overly anxious for your next ZX Computing, Super Media Manager is a sophisticated and versatile system for manipulating, handling and editing microdrives or discs as well as recovering corrupt or otherwise lost data. It allows file copying from other disc formats (CP/M, PC-DOS and MS-DOS, for example) and direct sector editing of QL microdrives/discs and non-QL discs and full copying facilities by device, sector or file. You even get a Hex calculator and the 80-page manual — like the one for Supercharge — is clear, well-written and an entertaining read. The latter makes Super Media Manager a minor miracle of the micro industry all by itself, but if you're at all concerned with data retrieval, editing and efficient manipulation, it becomes a top priority on the shopping list.

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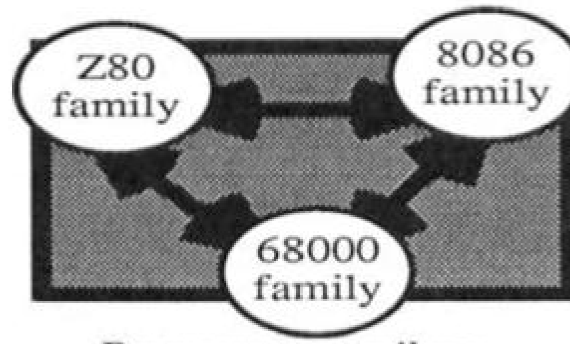
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QL SuperBASIC

Sitting inside its black box, the QL's electronic working parts labour at phenomenal speed producing all sorts of results which should be of some use to the operator. But those results are useless while they're locked away inside that black box. The QL has to be able to communicate with the outside world; to receive instructions and data, and transmit results in a form which can be clearly understood by the user.

Several parts of this series have covered the SuperBASIC commands which facilitate the QL's contact with the outside world. Windows and 'consoles' were covered in part 1, and graphics in parts 4 and 5. These articles have shown how the QL uses the screen to display the results of its work. But communication is much more than just the screen; in this, the final part of the series, we'll be examining some other aspects of communication; the keyboard, sound, serial and joystick ports, microdrives, and the network system.

Input

There are three SuperBASIC commands which cause the computer to respond to key presses; INPUT, INKEY$, and KEYROW.

INPUT is the easiest to understand, and easiest to use in a program. Whenever a program encounters the INPUT command it stops to wait for the response of the user. To tell you it is waiting, the QL places a flashing cursor on the screen. Without qualifying INPUT, that cursor appears in the default window (#1) but the cursor can be directed to the next print position in any other window defined as a console device by specifying the window channel number, e.g. **INPUT #2,a$** sends the cursor to window # 2, and the response (whatever the user types in) is transferred to the string 'a$'. As keys are pressed the appropriate character appears on the screen, under the cursor, which moves to the right, awaiting the next keypress.

INPUT is used with any console device, i.e. windows 0,1 and 2, or any others you may have specified with the CON_ command. Pressing 'ENTER' after your response terminates the INPUT command, sending your entry to the specified variable. Note that the INPUT command can be used in situations other than gaining a user response form the keyboard (more on that later).

With INPUT, zero, or one or more characters can be entered at one time. Within the limits of the input buffer associated with the console device being used (see part 1 of this series), any number of characters may be entered. Using 'ENTER' informs the computer when sufficient characters have been entered.

INKEY$ and KEYROW are commands which seek just a single keypress. But these two commands work in quite different ways, and using the wrong one can create some strange effects.

Procedures

Fig.1. is a listing of several procedures which have been written to provide a demonstration of the subtle differences between INKEY$ and KEYROW. Once you have entered the program lines, the first procedure to try is one called 'INKEY_CHECK'. Type in the direct command 'inkey_check', and press 'Enter'.

This procedure is a very simple one; it prints a message on the screen asking you to press a key; a delay of approximately ten seconds is generated by the DELAY procedure (which uses a FOR. . .END FOR loop) for you to respond, then the results are printed out of all the keys which were pressed.

'if you take a look at the listing, you'll notice that the INKEY$ command (line 80) is outside the loop which causes the delay. If you fail to press any keys during the delay, then line 90 is not implemented (surprise, surprise!). But, if you press one or more keys, then all the keypresses you make will be listed in turn by the command in line 90 — even though INKEY$ was not implemented during the delay loop.

When you press a key, it is recorded by the computer with that character being placed into an input buffer; all keypresses are stored in this way. INKEY$ reads the input buffer, working on a first in/first out basis. So in the loop between lines 70 and 100, as long as there are characters in the input buffer which were placed there either during the delay or some other time afterwards (but before implementation of the INKEY$ command), these characters will be extracted by INKEY$, placed into the variable 'z$', and printed onto the screen.

It is a common programming fault to use INKEY$ when an 'instant' check on the keyboard is required. As you can see, if a key is accidentally pressed before INKEY$ is encountered, INKEY$ responds to the earlier keypress. In games, this can result in the computer apparently making a premature decision for you. You could make sure the input buffer was empty using the simple construction:

```
REPeat loop
IF INKEY$ ="" THEN EXIT loop
END REPeat loop
```

before using INKEY$ again to check for a keypress, but KEYROW is the correct command for an instant check. But before we consider KEYROW, you might find it fun to play around with INKEY$ a little more.

The parameter in brackets after INKEY$ defines how long the computer will wait for a response from the user. The '0' in line 80 means a zero delay; try replacing the zero with larger numbers. See what the effect might be on pressing one key

during the delay, then several. The parameter '−1' causes the program to wait indefinitely until a key is pressed. Can you see why, with INKEY$ (−1) you'll never exit from 'loop1'?

The delay in the 'INKEY_CHECK' procedure was (deliberately) caused by a FOR...END FOR loop rather than the PAUSE command. Another procedure, LONG_PAUSE, appears in fig.1 which uses PAUSE to generate the delay. Note that when you use this procedure the PAUSE command is brought to a premature end by pressing a key. This is a useful feature as you can use PAUSE without a parameter to cause an indefinite delay, ended only by a keypress. Of course, if there is a character in the input buffer before the program gets to the PAUSE command, then PAUSE is overlooked!

Like the INPUT command, INKEY$ can also be used to extract data from files. The QL keyboard has 65 keys; if you consider the two shift keys as one, this can be reduced to 64 — a beautifully round number which allows all the keys to be grouped into eight sets of eight keys.

Keyrow

The KEYROW command allows

Part 6: David Nowotnik plugs into the QL's communications abilities.

the programmer to make a check on which key is being pressed (in any group of eight) at any moment in time. It responds to the keyboard, not the input buffer, so the check is truly instant. The way the 64 keys are grouped into eight sets is shown in the keywords section of the QL User Guide. In group 1 are the four 'arrow' keys, 'ENTER' and 'SPACE', plus 'ESC' and '/'. It is this group which is checked in the KEYROW_DEMO procedure in fig.1. With this listing in the computer, type in keyrow_demo as a direct command, and watch what happens.

This procedure displays three boxes on the screen. For the moment, take a look at the top box only. Pressing any key from the above group will cause one

Fig.1. Demonstration Routines for INKEY$ and KEYROW

```
10 REMark      Demonstrations of
20 REMark      INKEY$ and KEYROW
30 :
40 DEFine PROCedure INKEY_CHECK
50 PRINT "press any key"
60 DELAY 100
70 REPeat loop1
80   z$=INKEY$(0): IF z$="" THEN EXIT loop1
90   PRINT "You pressed - ";z$;" -"
100 END REPeat loop1
110 PRINT "That's all"
120 END DEFine INKEY_CHECK
130 :
140 DEFine PROCedure LONG_PAUSE
150 PRINT "press any key"
160 PAUSE 500
170 z$=INKEY$(0)
180 PRINT "You pressed - ";z$;" -"
190 END DEFine LONG_PAUSE
200 :
210 DEFine PROCedure TV
220   MODE 8: WINDOW 512,256,0,0
230   PAPER 0: CLS
240   WINDOW 448,200,32,16
250   WINDOW #2,448,200,32,16
260   WINDOW #0,448,40,32,216
270   PAPER 2: PAPER #2,1: PAPER #0,0
280   INK 7: INK #2,7: INK #0,7
290   CLS: CLS #0
300 END DEFine TV
310 :
320 DEFine PROCedure KEYROW_DEMO
330 TV
340 FOR i=3 TO 5
350   OPEN #i, scr
360   WINDOW #i,140,25,200,(i-2)*50
370   INK #i,0: PAPER #i,6
380   BORDER #i,2,1: CLS #i
390   CSIZE #i,3,1
400 END FOR i
410 CSIZE 3,1: PRINT"    KEYROW DEMONSTRATION"
420 INK 0: PRINT \"KEYROW (1)"
430 CURSOR 220,62: PRINT "&&"
440 CURSOR 40,90: PRINT "MASK"
450 CURSOR 30,140: PRINT "EQUALS"
460 BINARY (64): PRINT #4,bin$
470 CURSOR 360,90: PRINT "=64"
480 REPeat loop2
490   z=KEYROW (1)
500   BINARY z: PRINT #3,bin$
510   CURSOR 360,40: PRINT "    "
520   CURSOR 360,40: PRINT "=";z
530   BINARY (z&&64): PRINT #5,bin$
540   CURSOR 360,140: PRINT "    "
550   CURSOR 360,140: PRINT "=";z&&64
560 END REPeat loop2
570 :
580 DEFine PROCedure BINARY (z)
590 LOCal i,k,a$,l
600 a$="":k=z
610 FOR i=1 TO 8
620   l=k MOD 2
630   IF l THEN
640     a$="1"&a$
650     ELSE : a$="0"&a$
660   END IF
670   k=INT (k/2)
680 END FOR i
690 bin$=a$
700 END DEFine BINARY
710 :
720 DEFine PROCedure DELAY (x)
730 LOCal i
740 FOR i=1 TO 100*x
750 END FOR i
760 END DEFine DELAY
```

Fig.2. Experiment with the BEEP parameters

```
10 REMark Beep Experimentor/*
20 REMark by David Nowotnik
30 REMark    June 1986
40 :
50 :
60 INIT: OPTION
70 :
80 DEFine PROCedure TV
90   MODE 8: WINDOW 512,256,0,0
100   PAPER 0: CLS
110   WINDOW 448,200,32,16
120   WINDOW #2,448,200,32,16
130   WINDOW #0,448,40,32,216
140   PAPER 2: PAPER #2,1: PAPER #0,0
150   INK 7: INK #2,7: INK #0,7
160   CLS: CLS #0
170 END DEFine TV
180 :
190 DEFine PROCedure INIT
200 TV
210 CSIZE 3,1: PRINT"      BEEP EXPERIMENTOR"
220 DATA 0,255,"Pitch_1",210,50
230 DATA 0,255,"Pitch_2",60,110
240 DATA -32768,15,"Grad_X ",210,110
250 DATA -8,7,"Grad_Y ",360,110
260 DATA 0,32767," Wrap  ",60,170
270 DATA 0,15," Fuzzy ",210,170
280 DATA 0,15,"Random ",360,170
290 DIM a$(7,7),b(7,3)
300 RESTORE 220
310 FOR i=1 TO 7
320   READ b(i,1): READ b(i,2): READ a$(i)
330   READ c: READ d
340   OPEN #(i+2),scr
350   WINDOW #(i+2),95,40,c,d
360   BORDER #(i+2),2,1
370   PAPER #(i+2),6: INK #(i+2),0
380   CLS #(i+2): b(i,3)=0
390   PRINT #(i+2),a$(i): BOX (i)
400 END FOR i
410 END DEFine INIT
420 :
430 DEFine PROCedure BOX (x)
440 LOCal q$,z$,l
450 AT #(x+2),2,0: PRINT #(x+2),"       ";
460 q$=b(x,3): l= LEN (q$)
470 z$="       ": z$=z$(1 TO (7-l)/2)
480 q$=z$&q$
490 AT #(x+2),2,0: PRINT #(x+2),q$;
500 END DEFine BOX
510 :
520 DEFine PROCedure OPTION
530 LOCal ii,h
540.ii=1: h=0: BOX_COLOUR ii,1
550 REPeat main_loop
560   IF h=0 THEN
570     CLS #0: h=1
580     PRINT #0,"Press 'space' to activate the sound"\"Arrow up/down t
o alter value by one"\"arrow left/right tomove to new box"\"or press 'c' to
change the value."
590   END IF
600   z= CODE (INKEY$(100))
610   SELect ON z
620   =192: BOX_COLOUR ii,2
630         BEEP
640         ii=ii-1
650         IF ii=0 THEN ii=7
660         BOX_COLOUR ii,1
670   =200: BOX_COLOUR ii,2
680         BEEP
690         ii=ii+1
700         IF ii=8 THEN ii=1
710         BOX_COLOUR ii,1
720   =208: IF b(ii,3)<b(ii,2) THEN
730           b(ii,3)=b(ii,3)+1
740         END IF
750         BEEP
760         BOX (ii)
770.  =216: IF b(ii,3)>b(ii,1) THEN
780           b(ii,3)=b(ii,3)-1
790         END IF
800         BEEP
810         BOX (ii)
820   =99,67: BEEP
830         CLS #0: h=0
840         REPeat ask
850           PRINT #0,"Enter a new value (";b(ii,1);" to ";b(ii,2);")
";
860           INPUT #0,val
870           IF val >= b(ii,1) AND val <= b(ii,2) THEN EXIT ask
880           PRINT #0,"  Value out of range, try again "
890         END REPeat ask
900         b(ii,3)=val
910         BOX(ii)
920    =32: CHANGE_BEEP
930    = REMAINDER : BEEP
940    END SELect
950 IF KEYROW (1)= 64 THEN
960   CHANGE_BEEP: ELSE : BEEP
970 END IF
980 END REPeat main_loop
990 END DEFine OPTION
```

▶ ▶ ▶

of the eight zeros in the box to convert to a figure 1. That '1' only remains in the box while the key is pressed. Note that each key in the above group switches a different '0' to '1', and pressing any key outside of the group has no effect.

So, each digit in the group of eight acts as an on/off indicator for each key in the group. A string of ones and zeros can be regarded as a binary number; each combination of the eight '1's and '0's is equivalent to a single decimal number ranging between 0 and 255. That decimal number is shown to the right of the box. Pressing the space bar generates the number '64'. i.e., the function KEYROW (1) will return a value of 64 if the space bar is pressed when the function is called. So, you could check if the space bar is being pressed with the program line:

IF KEYROW (1) =64 THEN...........

However, if you press more than one key at a time from the above group, the 'on-off' indicator shows all keys pressed from the group, and the decimal number returned by KEYPRESS is the sum of the individual KEYPRESS values. For example, if you press 'space' and 'Enter' the resultant decimal value of KEYPRESS (1) is 65.

There is a technique you can use to screen out unwanted keypresses, so that you can test for a key being pressed, even if it is pressed in combination with other keys. It makes use of the logical AND operator, '&&'.

At this stage, it would be all too easy to go off at a tangent on binary arithmetic. So, to avoid complex explanations, take a look at the centre box on the KEYROW_DEMO procedure. This is a 'mask' of value 64 (the same as the value of 'space' with KEYROW (1)). The result of combining the value of KEYROW (1) and the value of the 'mask' with the '&&' operator is shown in the lower box. Only when the space key is pressed will the resultant value in the lower box be 64, even if 'space' is pressed with another key in the KEYROW (1) group. The values of the other keys are masked out. So, the program line:

IF KEYROW (1) && 64=64 THEN ....

will always be true if 'space' is pressed, even if it is pressed in combinaton with another key.

In summary, if you are writing an 'action' game program, use of KEYROW, plus a logical AND mask, is a must. Other single keypresses can be detected with INKEY$, while INPUT is used for entry of a single input of several characters.

```
1000 :
1010 DEFine PROCedure BOX_COLOUR (n,type)
1020 LOCal s,win
1030 s=type: win=n+2
1040 SELect ON s
1050  =1: RECOL #win,2,1,0,3,6,5,4,7
1060       INK #win,2: PAPER #win,4
1070  =2: RECOL #win,2,1,0,3,6,5,4,7
1080       INK #win,0: PAPER #win,6
1090 END SELect
1100 END DEFine BOX_COLOUR
1110 :
1120 :
1130 DEFine PROCedure CHANGE_BEEP
1140 IF BEEPING THEN RETurn
1150 BEEP 0,b(1,3),b(2,3),b(3,3),b(4,3),b(5,3),b(6,3),b(7,3)
1160 END DEFine CHANGE_BEEP
```

QL sound

While other manufacturers placed dedicated sound chips into their microcomputers, the Sinclair design team — under instructions to keep down costs — used multipurpose processors for generating sound. In the Spectrum, the Z80 CPU generated the wave forms to create sound. This ties up the processor so that everything else stops while sound is being generated. The QL, fortunately, has a second processor, an 8049 chip, which handles sound generation (and most other input/output operations). So, using the BEEP command on the QL causes the main 68008 processor to send a simple command to the 8094 chip, then the 68008 can carry on with its main work, leaving the 8049 to BEEP.

The problem with the QL BEEP command is its complexity (it can take up to eight parameters) and unpredictability (it can be difficult to predict the outcome of changing even just one of the parameters). The QL User Guide suggests that anyone using BEEP should experiment to achieve any desired effect; and the listing in fig.2. provides you with a suitable experimentor program.

As usual, type in the listing, save, and run it. On the screen you'll get seven boxes, each representing one of the BEEP command parameters (except the simplest, the duration parameter). The program is simple to use. At any one time, one parameter is 'active', and its box appears as a different colour. You can change the value of the active parameter (the value is always shown in the box) one unit at a time by pressing the up or down arrow keys (to the right of the space bar). If you want to make a big change, press the 'c' key, and enter a value as requested. The range of permitted values is shown as soon as 'c' is pressed. If you want to make active another box, press either the left or right arrow key, to the left of the space bar. To try out a sound, press the space bar. The sound will continue until you stop pressing space.

Once you have discovered a sound you like, write down all the parameters. To include this sound in a SuperBASIC program, you will use the BEEP command, to which you add all the parameters in the order that the parameter boxes appear on the screen in the experimentor program. Of course, the duration parameter also has to be added; this comes first in the list of parameters.

When using sound in a program, remember that you can turn off a sound by using the BEEP command without any parameters, and within a program you can detect whether a sound is being produced with the BEEPING function. Thus,

IF BEEPING THEN ....

The BEEPING function returns a value of 1 if sound is being produced, zero if BEEP is off.

If you look carefully through the listing in fig.2, you should recognise several of the concepts developed earlier in the series.

Microdrives

Next on this world-wind tour of i/o devices are the microdrives. Without previous knowledge of FORMAT, LOAD and SAVE anyone reading this series will have

Fig.3. Cartridge Backup Copier

```
1000 REMark Cartridge backup copier
1010 REMark
1020 MODE 512
1030 WINDOW #0,512,256,0,0
1040 WINDOW #1,440,256,70,0
1050 WINDOW #2,512,256,0,0
1060 PAPER #0,2: CLS #0
1070 PAPER 3: INK 7
1080 PAPER #2,2: INK #2,2
1090 CSIZE #0,2,1: INK #0,7
1100 AT #0,2,8: PRINT #0,"CARTRIDGE BACKUP COPIER"
1110 CSIZE #0,0,0
1120 x=22 : y=10
1130 AT #0,y,x  : PRINT #0,"This program allows you to copy
the"
1140 AT #0,y+1,x: PRINT #0,"entire contents of one cartridge
"
1150 AT #0,y+2,x: PRINT #0,"onto another."
1160 AT #0,y+4,x: PRINT #0,"Place the ORIGINAL in mdv2 and a
blank"
1170 AT #0,y+5,x: PRINT #0,"in mdv1. CAUTION the cartridge in
mdv1"
1180 AT #0,y+6,x: PRINT #0,"will be re-formatted."
1190 AT #0,y+10,x+5: PRINT #0,"Press any key to start."
1200 z$=INKEY$(-1): CLS #0
1210 gp$="          "
1220 CLS: PRINT\"Step 1 - Format mdv1"
1230 FORMAT mdv1__
1240 PRINT\"Step 2 - Create a temporary file of mdv2
directory on mdv1."
1250 OPEN_NEW #3, mdv1_temp_file
1260 DIR #3,mdv2_: CLOSE #3
1270 OPEN_IN #3, mdv1_temp_file
1280 INPUT #3,a$;a$
1290 PRINT\"Step 3 - Copying....."\\
1300 REPeat loop
1310   IF EOF (#3) THEN EXIT loop
1320   INPUT #3,a$
1330   PRINT gp$&a$
1340   COPY 'mdv2_'&a$ TO 'mdv1_'&a$
1350 END REPeat loop
1360 CLOSE #3
1370 PRINT\"Step 4 - Delete the temporary file on mdv1."\\
1380 DELETE mdv1_temp_file
1390 PRINT\"     THAT'S IT!    Any more? (y/n)"
1400 REPeat try
1410   z$=INKEY$(-1)
1420   IF z$="y" OR z$="Y" OR z$="n" OR z$="N" THEN EXIT try
1430 END REPeat try*x
1440 IF z$="y" OR z$="Y" THEN RUN
1450 NEW
```

QL SuperBASIC

spent a lot of time typing in programs without preserving them on microdrive and losing all when switching off their QL's at the end of a work session! So, taking FORMAT, LOAD, and SAVE for granted, what else can be done with microdrives?

The DIR command will display in window 1 the directory (or list of contents) of a cartridge in either microdrive, e.g. 'DIR mdv1_' or 'DIR mdv2_'. If you want to send the directory listing to any other screen, then you must specify the channel number, e.g. 'DIR # 2, mdv1_' will send the directory to window #2. The same directory can be transmitted along any other channel — 'OPEN # 4, ser' will open channel 4 to serial port 1, after which 'DIR # 4, mdv1_' will transmit the directory to the serial port, and thereafter, to the device connected to this port. This is one way to obtain a printer listing of a microdrive directory. Remember to CLOSE the channel after use.

The COPY command can be extremely useful. For instance, 'COPY mdv1_filename to scr' will copy the contents of a file on mdv1_ called 'filename' (which can be a SuperBASIC program, Quill document, or any ASCII file produced by a text editor) to the screen without that file being loaded into RAM. You can view the file, and if it is a long file, pressing 'F5' and 'CTRL' at the same time will freeze the screen (and copy command) to prevent scrolling. Pressing any key then unfreezes the screen, to let more of the file be read from the drive.

One of the simplest ways of producing a printer listing of a program is through the COPY command. With a printer connected to ser1, 'COPY mdv1_filename to ser1' will copy the file to the printer. And, of course, the COPY command allows you to produce the essential backup of files:

COPY mdv1_filename TO mdv2_filename

duplicates the file called filename on mdv1_ to mdv2_, giving it the same filename.

In fig.3. you'll see a simple backup program which will copy all of the files on mdv2 to a cartridge in mdv1.

The program produces all the operating instructions on the screen. Place the original in drive 2, and a blank or unwanted cartridge in drive 1. Pressing any key formats drive one, then copies all files across.

The way this program works demonstrates some important principles of file handling on microdrives. In line 1250, a new file is created on mdv1 called temp_file; this file is linked to channel # 3. The simple command in line 1260 (DIR 3,mdv2_) places in 'temp_file' the directory of microdrive 2. The file is then closed.

The contents of that file can be read, item by item, in a sequential manner (first in, first out). In line 1270 channel 3 is opened to 'temp_file' on mdv1_; the OPEN_IN' command ensures that data can only be read from the file, and prevents accidental data transfer to the file. The first two items on the file are not directory file names, so these are pulled off the file, and discarded (line 1280). Note the use of INPUT to take a string of data from the microdrive file.

Inside the REPeat loop (lines 1300 to 1350) the directory file names are read sequentially (line 1320) from temp_file and placed in the string 'a$'. These names are printed on the screen (line 1330) for confirmation, then embedded in the COPY command (line 1340) to effect the transfer of files.

The EOF function (line 1310) detects when the end of 'temp_file' has been reached, and permits the program to exit from the loop. Channel # 3 is then closed, and 'temp_file' deleted (line 13807.

Files

Fig.4. contains another demonstration of microdrive file handling. For those who typed in, and, hopefully enjoyed the 'Breakout' program from part 5 of this series, printed last month, the listing in fig.4 adds a high score facility to that game. Many computer games have high score facilities which allow you to recognise the best scores achieved in any one session. But once you finish playing, and switch off the computer, the high score table is lost, and the next time you play, you start all over again. Not so with this new high score facility for 'Breakout'. When a session is completed, a file of high scores on microdrive (1) is updated, so that the next time you play the all-time-best scores remain to be beaten.

To use this facility with 'Breakout', type out the listing in fig.4. and save it. Then load 'Breakout' and MERGE in the new program lines. Save the expanded 'Breakout' program on microdrive. With the microdrive in drive 1, use the direct command 'create_file' (line 4000) to produce the empty data file.

The listing contains procedures to update the high score table in memory, enter the name (eight characters) and date (dd/mm/yy) when a 'top 5' score is achieved, and a routine to print the high score table on the screen.

The principles developed for loading the directory file (fig.3.) apply also to the high score file, so the load procedure (lines 4110 to 4210) should need no explanation. Saving the file is carried out by the 'adjust_file' procedure (lines 4540 to 4650). First, the old high score file is deleted (line 4570), then a new file created (4580), and the new values, names, and dates entered into the file sequentially. Transfer of data to the file uses the PRINT command (lines 4660 and 4610). The file is then closed (line 4630) ready for use next time.

Ports

Moving from front to back of the QL, there are three types of i/o ports which are accessible from SuperBASIC.

The serial ports adopt the 'standard' called RS232C, to allow communication with other devices, like printers and modems, as long as they also use this communication standard. In essence, data is sent down a wire one bit at a time. The speed of transfer is known as the baud rate (bits per second), and both serial ports can be set to a particular baud rate with the BAUD command. There are only a certain number of acceptable baud rates, ranging from 75 to 9600, and it is vital that the device for communication has the same baud rate as the computer.

Data can be sent in both directions, so there are two 'wires' for data transfer (one for each direction). The way the socket is wired up defines one device as a transmitter, and one as a receiver. On the QL, ser1 is

the 'transmitter', and ser2 the 'receiver'. But don't be fooled by this, as both ports can manage two way communication.

Several other factors need to be checked for compatability between the QL and communicating device. These are beyond the scope of this article, but they can make the use of the serial ports a real headache!

Assuming all is well, a simple COPY command can be used to create a printer listing. If you want to list a program which is in memory, then the following direct command will provide a printer listing:

OPEN # 4, ser1: LIST # 4: CLOSE 4

The problem with obtaining a listing in this way is that it is not possible to format the printer output in the way you would like it (e.g. setting margins, skip over the perforations, etc). The listing in fig.5. allows you to do this with Epson compatible printers. When you type and run the program, you'll get a series of questions on formatting the printer output (lines 100 to 150). When asked for normal or emphasised print, press '0' or '1'. The 'UK' character set will give you '£', but not '#', and the US set gives you '#' instead of '£'.

Between lines 150 and 170, all the appropriate control codes are sent to the printer. If you do not have an Epson printer, then check to see what the appropriate codes are for your printer, and subsitute them in this listing.

Finally, you get the chance to print a title to the listing (just press 'ENTER' if a title is not required). Enter the device name ('mdv_1' or 'mdv2_') and file name, and the printer listing is produced (line 360). The result should be neatly paginated printer listings, with pages you can tear at the perforations without ripping the text!

If you plan to use joysticks with your QL, then you'll need to make sure they are fitted with BT plugs, or have adaptors to use joysticks fitted with standard 'D' plugs. No special programming is needed in order to use joysticks, as they duplicate certain keys. All the joystick movements can be detected with a single KEYROW command. So, in your SuperBASIC program KEYROW command (0) will detect all the movements of a joystick connected to CTRL2, and KEYROW (1) can be used for a joystick connected to CTRL1. To confirm it, use the procedure 'keyrow_demo' in fig.1. with a joystick in CTRL1. Change the '1' to '0' in lines 420 and 490 to try this out with a joystick in CTRL2.

Fig.4. Extra program lines to add a high score facility to BREAKOUT.

```
5 load_file
135 Update_high_score (tot): print_high_score_table
190 IF z$="Y" OR z$="y" THEN GO TO 10
195 adjust_file
200 STOP
4000 DEFine PROCedure create_file
4010 LOCal a$,b$,i
4020 OPEN_NEW #4, mdv1_high_score
4030 a$="Ivan Ore": b$="01/01/83"
4040 FOR i=1 TO 5
4050   PRINT #4,0
4060   PRINT #4,a$: PRINT #4,b$
4070 END FOR i
4080 CLOSE #4
4090 END DEFine create_file
4100 REMark ************************
4110 DEFine PROCedure load_file
4120 LOCal i,x,n$,d$
4130 DIM high (5),name$(5,8),dates$(5,8)
4140 OPEN_IN #4,mdv1_high_score
4150 FOR i=1 TO 5
4160   INPUT #4,x: high(i)=x
4170   INPUT #4, n$: name$(i)=n$
4180   INPUT #4, d$: dates$(i)=d$
4190 END FOR i
4200 CLOSE #4
4210 END DEFine load_file
4220 REMark ************************
4230 DEFine PROCedure Update_high_score(sc)
4240 LOCal i
4250 IF sc<=high(5) THEN RETurn
4260 FOR i=5 TO 1 STEP -1
4270   IF i<5 THEN
4280     high(i+1)=high(i)
4290     name$(i+1)=name$(i)
4300     dates$(i+1)=dates$(i)
4310   END IF
4320   IF i=1 THEN enter_score i,sc: EXIT i
4330   IF sc>high(i) AND sc<=high(i-1) THEN
4340     enter_score i,sc: EXIT i
4350 END IF
4360 END FOR i
4370 END DEFine Update_high_score
4380 REMark ************************
4390 DEFine PROCedure enter_score (x,y)
4400 LOCal z$,n$,d$
4410 high(x)=y
4420 CLS #0: PRINT #0," You're score has gone into the all time top 5!"
4430 REPeat enter_name_date
4440   CLS: INPUT\\\ "Enter your name........ ";n$
4450   INPUT\\\"Date? (dd/mm/yy)....... ";d$
4460   PRINT\\\"        Is this OK? (y/n)"
4470   z$=INKEY$(-1): IF z$="y" OR z$="Y" THEN EXIT enter_name_date
4480 END REPeat enter_name_date
4490 n$=n$&"          ": name$(x)=n$(1 TO 8)
4500 d$=d$&"          ": dates$(x)=d$ (1 TO 8)
4510 CLS #0: CLS
4520 END DEFine enter_score
4530 REMark ************************
4540 DEFine PROCedure adjust_file
4550 LOCal i
4560 CLS #0: PRINT #0\"   Please wait, storing high score table"

4570 DELETE mdv1_high_score
4580 OPEN_NEW #4, mdv1_high_score
4590 FOR i=1 TO 5
4600   PRINT #4,high(i)
4610   PRINT #4,name$(i)\dates$(i)
4620 END FOR i
4630 CLOSE #4
4640 PAUSE 500: CLS #0
4650 END DEFine adjust_file
4660 REMark ************************
4670 DEFine PROCedure print_high_score_table
4680 LOCal i,z$
4690 CLS : PRINT\\"          HIGH SCORE TABLE"\\\
4700 PRINT "  Name         Score         Date"\\
4710 FOR i=1 TO 5
4720   PRINT TO 2,name$(i), TO 12, high(i), TO 22, dates$(i)
4730 END FOR i
4740 PRINT \\"   Press any key to continue"
4750 z$=INKEY$(-1)
4760 CLS
4770 END DEFine print_high_score_table
4780 REMark ************************
```

QL SUPERBASIC

Fig.5. Format the output to an Epson printer

```
10 REMark       Printer Format Program
20 REMark
30 REMark        for the Epsom RX80
40 REMark    by David Nowotnik - June 1986
60 REMark
70 CLS #2: CLS: CLS #0
80 AT 2,8 :PRINT "Printer format/listing"
90 AT 5,0 : INPUT "Enter page length (11)             ";p
100 INPUT "Enter line spacing (1/2)           ";s
110 INPUT "Enter no. of skip over line        ";k
120 INPUT "Enter left margin (0-70)           ";l
130 INPUT "Enter right margin (10-80)         ";r
140 INPUT "Enter normal(0) or emphasised(1) ";a
150 INPUT "UK (1) or USA (2) character set  ";y
160 a$=CHR$(27)
170 OPEN#5,ser1
180 PRINT #5,a$;"@";:                  REMark Initialise printer
190 PRINT#5,a$;"C";CHR$(0);CHR$(p);:  REMark page length
200 PRINT#5,a$;"A";CHR$(s*12);:        REMark line spacing
210 PRINT#5,a$;"N";CHR$(k);:           REMark skip over lines
220 PRINT#5,a$;"l";CHR$(l);:           REMark left margin
230 PRINT#5,a$;"Q";CHR$(r);:           REMark right margin
240 PRINT#5,a$;CHR$(70-a);:            REMark normal/emphasised
250 IF y=1 THEN
260   PRINT#5,a$;"R";CHR$(3);:         REMark UK character set
270  ELSE : PRINT#5,a$;"R";CHR$(0);: REMark US Character set
280 END IF
290 PRINT: INPUT " Title ?  ";b$
300 IF NOT b$="" THEN
310    PRINT #5,b$: PRINT #5: PRINT #5
320 END IF
330 PRINT: INPUT " Copy from device... ";b$
340 INPUT " File name.......... ";c$
350 CLOSE #5
360 COPY b$&c$ TO ser1
```

Networking

And finally, the network ports. A QL can be connected to one or more further QLs (or Spectrums) using a simple wire connector. The network is a serial communication system, with all the variables associated with the RS232C pre-set. But it is also very much more limited than the RS232 system. For example, you must ensure that receiver computers are listening before any data is transmitted.

All the concepts of file handling apply to the network, so the commands of COPY, OPEN, CLOSE, INPUT, PRINT, LIST, etc can be used with the network in much the same way as with other devices.

Before using the network, each QL in the network must be assigned a different station number. The command 'NET 1' sets the station number to 1. This permits the network to allow communication between two specific computers, even when there may be several in the network.

To transmit data on the network, the device name is 'neto_', and to receive, 'neti_'. With these rules, use of the network should be straightforward. So,

COPY mdv1_file_name TO neto_2

sends the file called 'file_name' on mdv1 to station 2.

OPEN # 4, neti_3: LOAD # 4: CLOSE # 4

loads a SuperBASIC program transmitted (using the SAVE command) from station 3.

And there ends the quick review of QL communication commands, and this series on SuperBASIC. There are several areas of SuperBASIC that time and space prevented us from reviewing. If you enjoyed the series, and would like other specific areas explained in ZX Computing, do write and let us know.

Part 5: Alan Davis explains how to get your adventure characters on the move.

Realms of Interaction

This month we'll be putting the finishing touches to our miniature world by dealing with independent movement of the computer-controlled characters. If you've been building up the routines from all the previous articles, you'll have noticed that so far Merlin's companions remain stubbornly rooted to the spot (unless indulging in a bit of thievery). The new routines for this month should get them flexing their leg muscles . . .

Actually, independent movement does pose certain problems in a general series of articles like these, since the way you want your characters to move will depend very much on the plot of the particular adventure you're writing. If all you're looking for is a general background atmosphere of bustle and vitality then random movement may be all that you need, and in fact this is all we can sensibly deal with here. This is the kind of movement which seems to predominate in games such as Kim Topley's Fantasia Diamond (Hewson's) — an adventure which positively bristles with activity. Of course this does fall short of the pseudo-intelligent wanderings of Lestrade, in Sherlock, or of the orc hunters in Runestone — but then we have to start somewhere!

Merlin in motion

Listing 1 gives the assembly language program you'll need to set Merlin's chums into motion — or if you prefer, use the BASIC program in Listing 2 which will POKE the code into memory and save it. To get the whole show on the road, load in last month's program as usual and BREAK. Load in this month's block of



code, and finally add the lines of BASIC from Listing 3. GOTO 9998 will save the whole lot in its updated form to tape (notice that line 9998 in listing 3 replaces an existing line in the previous program). Once everything is saved, GOTO 8010 should get the action started, and as you move Merlin around you'll notice several new things. Timbril, for instance, will tend to follow Merlin around — while other characters will wander about more or less as they like, doing whatever takes their fancy.

Well, you can safely leave them to look after things while we take a look at a few details of the programming. Whenever the machine code routine is called (LET m = USR 65000), each character is given the option of movement (with the exception of Merlin whose movements are entirely under your control of course). As the program stands, there's a 1 in 4 chance that any given character will decide to move. You can make movement more (or less) likely by changing line 90 in the assembler program: AND 1, for example, will increase the chance of movement to 1 in 2. Alternatively, try POKEing different values into 65016 if you want to do the job from BASIC (POKE 65016,0 will make them all rush around the place like mad things!) If you want to modify the routine so that it can deal with more characters you'll need to change the instructions at lines 60 and 200 in the assembler program. If you have X characters altogether *(including* Merlin) then change line 60 to LD B,X-1 and line 200 to LD A, X+1. Or you could POKE 65008,X-1 and POKE 65039,X+1 directly from BASIC. If you require some characters to be kept stationary — perhaps to do some specific task task such as guarding a route or a treasure — no problem. When you set up your list of characters, just make sure that all the 'mobile' ones come at the begining of the list with the stationary ones at the end — and then modify the machine code as above with 'X' taking the number of mobile characters. It will then ignore the others when it runs.

While the machine code routine is in operation, movement may be occurring 'behind the scenes' which the player knows nothing of; but if a character leaves or enters Merlin's current location then obviously a text message has to be printed up announcing this. Whenever this situation arises the routine does an immediate return to BASIC, with the variable m containing the numeric code of the character who has just arrived or left. We need more information than this, however, and to get it we need to PEEK 65220 which will hold one of five possible values as follows:
1) A value of 5 indicates that a character has just arrived, in which case a message of the type "So-and-so arrives" needs to be printed.
2) Values of 1,2,3, or 4 indicate that a character has just left, moving north, south, east, or west respectively. Line 2030 of Listing 3 shows how the necessary text is generated.
Of course it's possible that no character will either enter or leave Merlin's location during any one 'turn'. In this event the variable *m* will be assigned the value zero when the return to BASIC is made, and no text printing is required (see the conditional jump at line 2010 in Listing 3).

The only other point worth mentioning about the movement routines concerns the way in which Timbril appears to dog Merlin's heels. As long as the number of followers of this kind is small, BASIC is perfectly adequate, and line 2000 in Listing 3 does the job for us here. All it does is compare Timbril's map coordinates with Merlin's, making them equal if they're not already, and print text as appropriate. You could sensibly add other conditions here, so that "following" occurs only if the characters are in adjacent locations, perhaps (IF ABS(PEEK(fklc+2) — io = 1 etc.

Interaction

That's about as far as we can go at present, but I'd like to spend a little time suggesting ways in which you can develop these interaction routines further. The obvious thing to try in the first instance is to increase the number of characters, objects, and locations; certainly a greater variety in the location descriptions would be no bad idea since these have been deliberately kept to a bare minimum here. I hope it's obvious how to go about this: it's just a matter of adding more DATA statements to the initialisation routines in the basic module (see the second article), dimensioning the arrays accordingly, and modifying the appropriate numeric constants.

You may also want to 'close off' certain routes in your adventure; as things stand Merlin can move anywhere within the map. You can do this very easily by making some of the locations 'no-go' areas in a logical way. A simple method would be to add "a mountain" to the list of location descriptions (giving this a numeric code of 6) and then change the contents of the array l() so that the mountains define the routes you need. You can then add a line of BASIC thus:

245 IF v=5 AND 1(io+ti,jo+tj) = 6 THEN LET z = "Merlin has no mountaineering equipment": GOSUB 100: GOTO 200.

For greater variety you could add walls, fences, impenetrable bogs, towering cliffs. . . it's up to you.

"Hang on a tick," I hear you say. "That's all very well for Merlin, but how do I stop the other characters from blundering into bogs or walking into walls?" Well — if you're really set on this then you've no alternative but to rewrite the machine code movement routines, inserting the necessary checks. But there may be no need for all this in many cases. Remember that you are, after all, creating only an illusion — and what the player doesn't know about he won't grieve over. Here's a question for you: can you tell (purely by playing the game) whether the hunter orcs in RUNESTONE move *through* the mountains, or skirt *around* them as the player must? (There are no prizes and in any case I'm not telling!)

Another aspect of these interaction routines which may alarm you is the sheer amount of memory they use, leaving correspondingly less space for your adventure. Don't worry. For a start, once you've decided on your characters, objects and so on, you can dispense with all those DATA statements in the initialisation section of the basic module since the arrays will all be stored in the variables area along with your program when you save it. (Of course this then means you'll have to CLEAR *before* you load in the program rather than within it as at present). Huge dollops of memory can be saved by replacing commonly occurring numbers with named constants (LET L = 1, LET Z = 2 etc.) Expressions like VAL "65000" will also save three bytes every time, but don't overuse this last trick or the speed of execution of the program will suffer. Clyde Bish's excellent RANDOM MEMORY series will give you lots more ideas for memory saving. Remember too that the whole point of the exercise is to make the independent characters an integral part of your adventure. These routines and ideas shouldn't be seen as mere window dressing or wasted space, but as a vital core from which your adventure develops.

This brings us to the end of the "Realms" series as I'd originally envisaged it, but I'm aware that I've left you rather badly in the lurch. The trouble with all these interactive characters is that the player will need to be able to *talk* to them — and he can't do that with your usual VERB/NOUN BASIC

command analyser, can he? Let's see — you want a parser which will cope with complex input like "GO NORTH AND ASK WILLIAM TO PUT THE GOLD BAR IN THE IRON CHEST." Yes? You'd like it in machine code for an instant response? And you'd like it suitably friendly so that it can be easily interfaced with the rest of your BASIC program?

What you need is VENTURESPEAK. Watch this space...

Listing 1

```
*HISOFT GENS3M2 ASSEMBLER*
        ZX SPECTRUM

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Pass 1 errors: 00

          10  *C-
FDE8      20              ORG   65000
FDE8      30              XOR   A
FDE9      40              LD    (EXIT),A
FDEC      50              LD    HL,FKLC+2
FDEF      60              LD    B,5
FDF1      70  LOOP        CALL  RND
FDF4      80              LD    A,(SEED)
FDF7      90              AND   3
FDF9     100              CP    0
FDFB     110              CALL  Z,MOVE
FDFE     120              LD    A,(EXIT)
FE01     130              CP    0
FE03     140              JP    NZ,QUIT
FE06     150              INC   HL
FE07     160              INC   HL
FE08     170              DJNZ  LOOP
FE0A     180              LD    BC,0
FE0D     190              RET
FE0E     200  QUIT        LD    A,7
FE10     210              SUB   B
FE11     220              LD    C,A
FE12     230              LD    B,0
FE14     240              RET
FE15     250  MOVE        CALL  RND
FE18     260              LD    A,(SEED)
FE1B     270              AND   3
FE1D     280              ADD   A,1
FE1F     290              LD    (DIR),A
FE22     300              CP    1
FE24     310              CALL  Z,NORTH
FE27     320              CP    2
FE29     330              CALL  Z,SOUTH
FE2C     340              CP    3
FE2E     350              CALL  Z,EAST
FE31     360              CP    4
FE33     370              CALL  Z,WEST
FE36     380              RET
FE37     390  NORTH       LD    A,(HL)
FE38     400              CP    1
FE3A     410              JP    Z,END
FE3D     420              CALL  TEST_D
FE40     430              DEC   A
FE41     440              LD    (HL),A
FE42     450              JP    TEST_A
FE45     460  SOUTH       LD    A,(HL)
FE46     470              CP    5
FE48     480              JP    Z,END
FE4B     490              CALL  TEST_D
FE4E     500              INC   A
FE4F     510              LD    (HL),A
FE50     520              JP    TEST_A
FE53     530  EAST        INC   HL
FE54     540              LD    A,(HL)
FE55     550              CP    5
FE57     560              JP    Z,END
FE5A     570              DEC   HL
FE5B     580              CALL  TEST_D
FE5E     590              INC   HL
FE5F     600              INC   A
FE60     610              LD    (HL),A
FE61     620              DEC   HL
FE62     630              JP    TEST_A
FE65     640  WEST        INC   HL
FE66     650              LD    A,(HL)
FE67     660              CP    1
FE69     670              JP    Z,END
FE6C     680              DEC   HL
FE6D     690              CALL  TEST_D
FE70     700              INC   HL
FE71     710              DEC   A
FE72     720              LD    (HL),A
FE73     730              DEC   HL
FE74     740              JP    TEST_A
FE77     750  END         XOR   A
FE78     760              RET
FE79     770  TEST_D      PUSH  AF
FE7A     780              LD    A,(FKLC)
FE7D     790              CP    (HL)
FE7E     800              JP    Z,TESTD2
FE81     810              POP   AF
FE82     820              RET
FE83     830  TESTD2      INC   HL
FE84     840              LD    A,(FKLC+1
)
FE87     850              CP    (HL)
FE88     860              DEC   HL
FE89     870              JP    Z,DEP
FE8C     880              POP   AF
FE8D     890              RET
FE8E     900  DEP         LD    A,(DIR)
FE91     910              LD    (EXIT),A
FE94     920              POP   AF
FE95     930              RET
FE96     940  TEST_A      LD    A,(FKLC)
FE99     950              CP    (HL)
FE9A     960              JP    Z,TESTA2
FE9D     970              JP    END
FEA0     980  TESTA2      INC   HL
FEA1     990              LD    A,(FKLC+1
)
FEA4    1000              CP    (HL)
FEA5    1010              DEC   HL
FEA6    1020              JP    Z.ARR
FEA9    1030              JP    END
FEAC    1040  ARR         LD    A,5
FEAE    1050              LD    (EXIT),A
FEB1    1060              RET
FEB2    1070  RND         PUSH  BC
FEB3    1080              PUSH  HL
FEB4    1090              LD    A,165
FEB6    1100              CALL  #2D28
FEB9    1110              RST   40
FEBA    1120              DEFB  47
FEBB    1130              DEFB  56
FEBC    1140              LD    B,29
FEBE    1150              RST   40
FEBF    1160              DEFB  59
FEC0    1170              DEFB  56
FEC1    1180              POP   HL
FEC2    1190              POP   BC
FEC3    1200              RET
FEC4    1210  EXIT        DEFB  0
FEC5    1220  DIR         DEFB  0
FD3F    1230  FKLC        EQU   64831
5C76    1240  SEED        EQU   23670

Pass 2 errors: 00

ARR      FEAC      DEP      FE8E
DIR      FEC5      EAST     FE53
END      FE77      EXIT     FEC4
FKLC     FD3F      LOOP     FDF1
MOVE     FE15      NORTH    FE37
QUIT     FE0E      RND      FEB2
SEED     5C76      SOUTH    FE45
TESTA2   FEA0      TESTD2   FE83
TEST_A   FE96      TEST_D   FE79
WEST     FE65

Table used:   227  from   284
```

Listing 2

```
  10 CLEAR 59999
  20 LET s=0
  30 FOR i=65000 TO 65219
  40 READ x: LET s=s+x: POKE i,x
  50 NEXT i
  60 IF s<>31929 THEN PRINT "ERR
OR!!": STOP
  70 SAVE "move"CODE 65000,220
  80 DATA 175,50,196,254,33,65,2
53,6,5,205
  90 DATA 178,254,58,118,92,230,
3,254,0,204
 100 DATA 21,254,58,196,254,254,
0,194,14,254
 110 DATA 35,35,16,231,1,0,0,201
,62,7
 120 DATA 144,79,6,0,201,205,178
,254,58,118
 130 DATA 92,230,3,198,1,50,197,
254,254,1
 140 DATA 204,55,254,254,2,204,6
9,254,254,3
 150 DATA 204,83,254,254,4,204,1
01,254,201,126
 160 DATA 254,1,202,119,254,205,
121,254,61,119
 170 DATA 195,150,254,126,254,5,
202,119,254,205
 180 DATA 121,254,60,119,195,150
,254,35,126,254
 190 DATA 5,202,119,254,43,205,1
21,254,35,60
 200 DATA 119,43,195,150,254,35,
126,254,1,202
 210 DATA 119,254,43,205,121,254
,35,61,119,43
 220 DATA 195,150,254,175,201,24
5,58,63,253,190
 230 DATA 202,131,254,241,201,35
,58,64,253,190
 240 DATA 43,202,142,254,241,201
,58,197,254,50
 250 DATA 196,254,241,201,58,63,
253,190,202,160
 260 DATA 254,195,119,254,35,58,
64,253,190,43
 270 DATA 202,172,254,195,119,25
4,62,5,50,196
 280 DATA 254,201,197,229,62,165
,205,40,45,239
 290 DATA 47,56,6,29,239,59,56,2
25,193,201
```

Listing 3

```
1998 REM *** Move Timbril
1999 REM
2000 IF PEEK (fklc+2)<>io OR PEE
K (fklc+3)<>jo THEN POKE fklc+2,
io: POKE fklc+3,jo: LET z$=FN n$
(2)+" arrives": GO SUB 100
2007 REM
2008 REM *** Move characters
2009 REM
2010 LET m=USR 65000: IF NOT m T
HEN GO TO 2040
2017 REM
2018 REM *** Has someone joined
             Merlin?
2019 REM
2020 IF PEEK 65220=5 THEN LET z$
=FN p$(m)+" arrives": GO SUB 100
2027 REM
2028 REM *** Is someone leaving
             Merlin?
2029 REM
2030 IF PEEK 65220<>5 THEN LET z
$=FN n$(m)+" moves "+FN d$(PEEK
65220): GO SUB 100
9998 SAVE "Merlin" LINE 8000: SA
VE "mc"CODE 64500,730
```



PERIPHERAL CONFLICT..... AND HOW TO

Fred Mullins takes you on a guided tour of the Spectrum input/output system and shows the advantages of being properly addressed.

The Input/Output system of Sinclair machines has at least been stable from the original ZX80 machine through to the new Spectrum 128 and equipment can be shared among them. . .with limitations?

The BASIC system consists of the 256 address locations allowed by the Z80 processor. These are addressed in the same way as memory but by using a different control signal (IORQ) and different machine code instructions.

Of these at least five address bits out of the eight available address bits have been allocated by Sinclair to themselves. These are:

A0 Keyboard and tape interface (first.5 bits d0-d5 for the keyboard, D7 for tape).

A1 for TV sync on ZX80 and ZX81 (as there was no separate part in the ULA for the video circuit and the Z80 had to play this part) and this was used to tell it when to output the screen. On the Spectrum this was unused as the ULA dealt with the screen.

A1 On the ZX Spectrum 128K and XK page memory (for the 48K Spectrum) systems this was used as a switch to bring in the extra pages of memory. The proper address for the Spectrum 128K is FD and changes the pages or brings in the AY8912 sound chip depending on address bits A14 and A15.

A2 used for the ZX printer, this is also used by many printer interfaces and pseudo zx printers such as the Alphacom 32 and the Seiko GP50S.

A3 & A4 are used for the ZX microdrive on the Spectrum, but were available on the ZX80/1 for add-ons.

All these bits must be at binary 1 (high or off) if these devices are not to appear on the data bus. Therefore the addresses must start at address 31 and go up in steps of 32 (in order to stop any of the address bits A0-A4 going to zero).

Working out an address

The A9 is equivalent of the unit in binary being 1 or 0 (odd or even number). Bit A1 is double that representing 2 or 0 etc, up to A7 which represents 128 or 0. The address is made by adding up all the numbers represented by ALL the bits.

On the Spectrum the Bin command will allow you to set bits (up to 16 bits) and then see the decimal result.

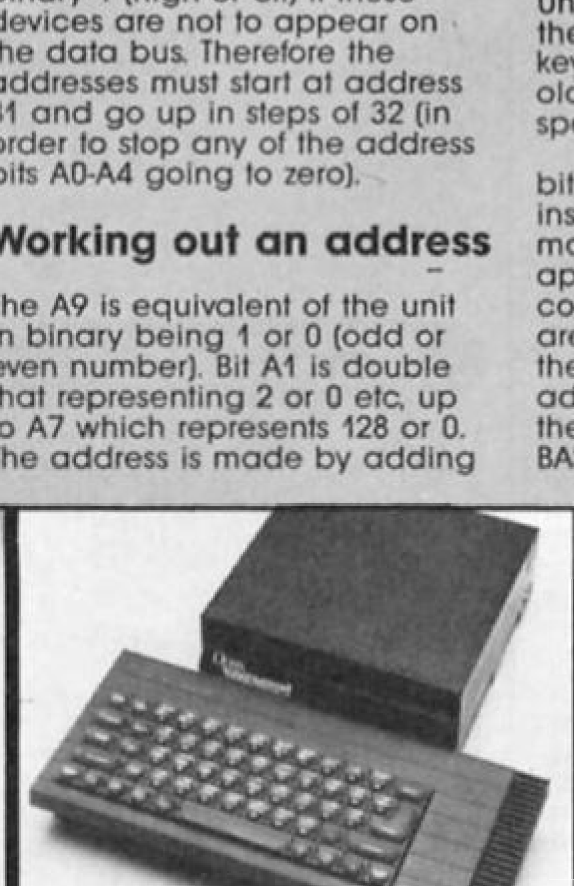
Try this program which demonstrates the effect on the address of each bit going low.

```
10 FOR X=0 TO 7: REM MAXIMUM NUMBER IN EIGHT BITS
20 LET A$="BIN 11111111"
30 LET A$(LEN A$-X)="0": PRINT a$;" = ";VAL A$;tab 20;"decimal"
40 PRINT
50 NEXT X
```

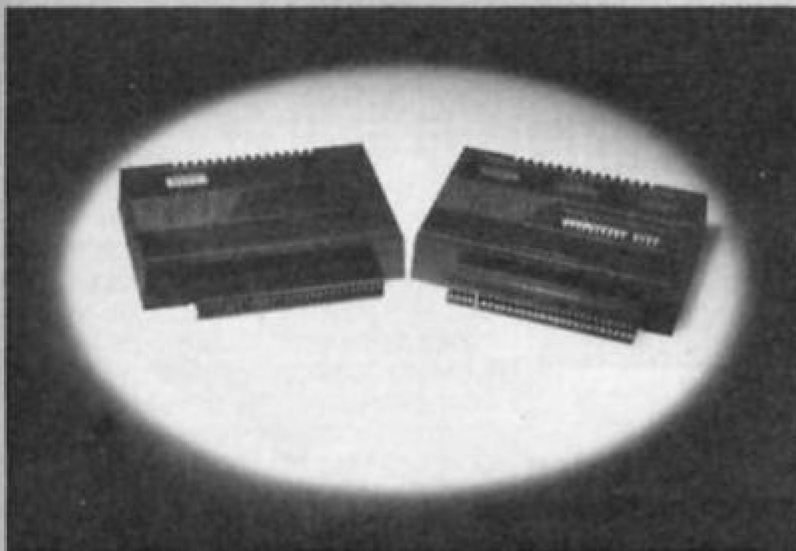
Sinclair found that by using a special instruction (IN A, (C) or OUT (C),A), on the Z80 you could extend these addresses to 16 bits (potentially 65535 addresses) and this was included in the first ZX Spectrum manual. Unfortunately Sinclair then broke the rules by accessing the keyboard, printer etc with the old eight bit instructions to save space.

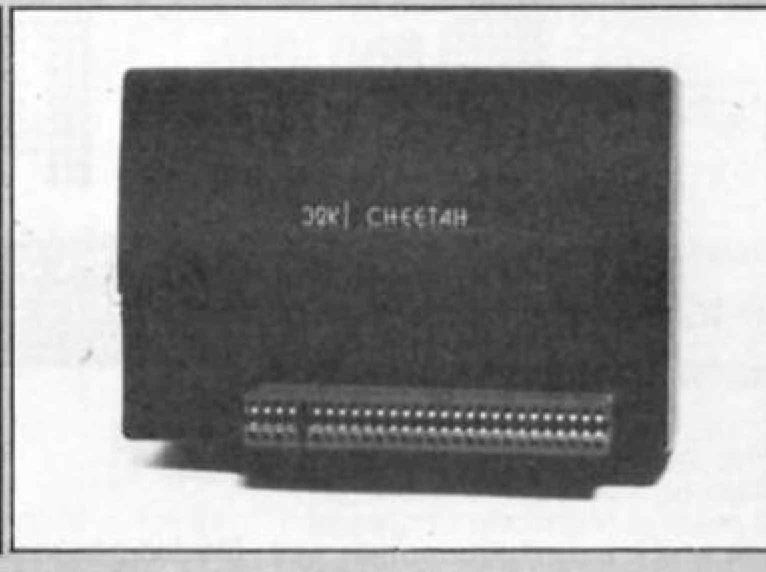
So although you can use a 16 bit address from BASIC for instance the same rules as with machine code have got to apply if you are not to reset or confuse the machine; ie, if you are testing one device such as the keyboard only one of the address lines must be zero, for the keyboard this is A0 (ie 254 in BASIC).











ADVOID IT.

Many of the I/O devices used on the ZX81 are therefore usable on the ZX Spectrum and vice-versa. As there was a rearrangement of the upper eight address lines this is not possible on devices which use these lines like the Kempston printer interface.

The Kempston joystick interface is however useable on the ZX81 (assuming you can include a bit of machine code in a REM statement at the beginning of the program as follows.

BASIC program to read Kempston interface

```
1 REM XXXXXXX
20 PRINT RANDOMISE USR 16514
```

Machine code poked into REM statement from address 16514 to 16520

Hex	Decimal	Instruction
01 00 00	1,0,0	LD HL,0 ;CLEAR RETURN REGISTER BC
DB 1F	219,31	IN A,31 ;GET JOYSTICK VALUE
4F	79	LD C,A ;STORE IN BC TO RETURN VALUE TO BASIC
C9	201	RET ;RETURN TO BASIC

This leaves just three address lines to play with A5,A6,A7. These on the Spectrum cause conflicts, if more than one device uses the same address or like the waferdrive use the Sinclair allocated addresses.

The Waferdrive uses addresses 0-15 and only turns off when the keyboard is read. This causes a conflict with the Kempston interface which only checks lines A5-A7. Therefore address 0-16 will bring in the Kempston joystick and the Waferdrive together and neither device will work.

Here is a list of addresses at which popular equipment works so you can avoid any clashes.

Kempston joystick	31 (only checks bits A5,A6,A7)
Waferdrive	0-15
Cursor joysticks	254 (some only check A0 low)
Programmable Joystick interfaces	254
RAM turbo	254,31 (keyboard and kempston)
Printer interfaces including GP50S and Alphacom 32/Timex 2040.	251 (anything with A2 low)
Kempston 'E' Printer interface	191 and 187 (A6 low only)
VTX500 modem	**255 & 127 (absolute addresses as all other bits checked A0-A6)**
RAM pages	253 (or any (Spectrum 128K) address with A1 low)

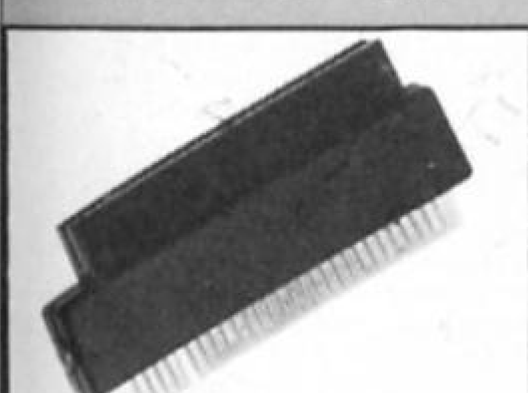
One solution to this problem is to only use the lower three bits to "hook" into the correct address and use the upper eight address lines (A8-A15) to address individual devices. Eprom services provide an add-on board which does just this if you have to use two devices which have same eight bit address (though you will have to change the address in software).

You can experiment on microdrives for instance by using OUT 0,0 which will crash the machine as it brings in the ULA and the microdrive together. Doing the same will also crash the machine if a ZX type printer is fitted. Reseting the machine will bring back the spectrum and no damage can be done by doing this.

Discdrives often use the same address as microdrives, so they cannot be used together and two printer interfaces certainly cannot be used.

I hope this has pointed out some of the problems in connecting up equipment on he back of a Sinclair computer and that certain combinations will not work. So if you are thinking of buying a new bit of equipment, make sure it fits in with your existing system.

Eprom Services, 3 Wedgewood Drive, Leeds LS8 1EF. Tele 0532-667183







Pro-Pascal

David Nowotnik looks at the latest language software for the QL.

For QL programmers seeking to move on from SuperBASIC to an alternative high level language, one which is compiled rather than translated (for greater operating speed), then Pascal is an attractive choice. It could be said that SuperBASIC was the result of combining the structured principles of Pascal with earlier versions of BASIC. Certainly, QL programmers will feel at home with Pascal's structured style, and many commands and syntax rules have some similarity with SuperBASIC.

The appearance of Pro PASCAL is not the first opportunity given to QL owners to try Pascal. The price of the package, at £99.95 is certainly high when compared with other QL Pascal compilers. But this compiler, the latest offering for the QL from Prospero Software, has several attractive features, and certainly compares favourably with the other Pascal compilers currently available.

Fig.1. Test programs in Pascal and Basic

a) Pascal

```
PROGRAM test_speed (input,output);

  { A simple test of operating speed }

  VAR a,c: INTEGER;
      b: REAL;

  BEGIN

     a := 0; b := 0;'c := 0;
     writeln('Start');
     REPEAT
        a := a+1;
        b := b+(a/10);
        c := a DIV 2;
     UNTIL a = 8000;
     { Now print results }
     writeln (a:1);
     writeln (b:1);
     writeln (c:1);

  END.
```

b) SuperBASIC

```
100 REMark  PROGRAM Test_Speed
110 REMark
120 REMark A simple test of operating speed
130 REMark
140 a%=0: b=0: c%=0
150 PRINT "Start"
160 REPeat loop
170   a%=a%+1
180   b=b+(a%/10)
190   c%=a% DIV 2
200   IF a%=8000 THEN EXIT loop
210 END REPeat loop
220 REMark Now print the results
230 PRINT a%
240 PRINT b%
250 PRINT c%
260 STOP
```

Pro-Pascal
Prospero Software
£99.95

Pro

The full package of Pro Pascal is very similar to the first language from Prospero Software for the QL, Pro FORTRAN-77, which was reveiwed in the July issue.

The compiler is supplied with a 170 page A5 manual in a hard-backed ring binder, plus software on three cartridges, and a plug-in ROM. Version 1.34 of the ROM (known as PRL, 'Prospero Resident Library') was supplied for review; this ROM is essential for compilation. It also has the run-time routines for the compiled programs, although there is a separate software PRL on one of the cartridges if you wish to run compiled programs independent of the ROM.

Like Pro FORTRAN-77, this Pascal compiler suffers from the unfortunate omission of a text editor, so users have to 'borrow' one from another software package to write their own source code.

The manual does not attempt to teach Pacal to beginners to programming, but experts in SuperBASIC or FORTRAN should have no difficulty in learning the elements of Pascal from the manual. And there are nine sample source listings on one of the cartridges, to practise using the compiler, and help learn the rudiments of Pascal.

Compiles

Compilation of source code is completed in three steps. The compiler itself works in two passes. Placing the first cartridge in mdv1_ and typing 'exec mdvi_pas' loads a control program which, in turn, loads the two compilation routines, and supplies the user with a list of compilation options.

These options, nine in total, allow you to select various features of the compiler, such as creating report files, creating compact (but slower running) code, and tracking source names and line numbers in run time (to help de-bug run-time errors). A rather attractive option is one that accepts only strict Standard Pascal. Pro Pascal operates to ISO 7185 standard, but offers a range of QL specific commands in its standard library. If you are intending to use Pro Pascal source code on other micros, it is useful to be able to supress the QL commands.

The compiler contains a comprehensive list of error codes, with meaningful error messages loaded in from a separate file (if RAM space is available) only if compile time errors occur.

Pass 2 of compilation requires replacing the first Pascal cartridge in mdv1 with cartridge 2. The third step, linking to library routines requires a further cartridge change. Despite all these changes, compilation is reasonably fast. For the simple example program shown in fig.1. passes one and two were completed in two minutes, while the link step took two and a half minutes. Compilation time is limited by microdrive access speed; the whole process is much faster with discs, and more convenient, as all compilation and linking routines can be stored on a single disc.

Utilities

There are several utility programs on the cartridges, so it is possible for users to create their own command libraries. These libraries can use modules from Pascal, or from routines written in Pro FORTRAN-77, or assembler. With the linker, machine code programs can be created of mixtures of Pascal and FORTRAN-77 routines. The run time routines in PRL (both ROM and software versions) will run both Pro Pascal and Pro FORTRAN programs.

The example Pascal program in fig.1. was written to compare operating speeds of the compiled program, with its SuperBASIC equivalent. With the ROM PRL installed, this program ran in six seconds, compared with 95 seconds for the BASIC version (in a standard QL). Interestingly, the Pascal program was slower (nine and a half seconds) using the software PRL. And, for further comparison, the compiled BASIC program ran in eleven seconds.

Pro Pascal provides compact code (the example program occupied six microdrive sectors), allowing very large programs to be compiled. In total, it is a very 'user-friendly' package, and ideal for both professional programmers and amateurs experienced in SuperBASIC.

The ZX81 is alive and well and ZXC keeps you informed!

A veritable onslaught of info this month with THREE items to report on.

POOTER GAMES, 24 Parsloes Ave. Dagenham, RM9 5NX have decided to step into Software Farm's shoes (after cleaning them first, chicken droppings are most unhygenic) and are offering a FREE paper network for ZX81 owners.

Notice how modern terminology gets everywhere, NEWSLETTER has been replaced by "Paper Network". Still, Garry Rowland says that ZX81 owners who want problems solved, news, contacts, or to air grievances should write, enclosing a SAE (or international reply coupon).

In 8-10 weeks the free broadsheet with all the messages will be distributed.

A great idea Garry, now its up to all the ZX81ers out there to take up your offer and to get writing!!!!

Extended Basic

Nick Godwin is another Bastion for ZX81ers (No Sir, that's not an insult), well known among us old hands and he has produced ZX81 EXTENDED BASIC or ZXEB which provides 44 extra commands available to those programming in BASIC.

Absolutely invaluable if you are a serious programmer giving commands to manipulate screen windows, read/date, scan the keyboard in different ways, DEEK, ON.GOTO and many other useful functions all in 2000 bytes!

Available from him at 4 Hurkur Cres. Eyemouth, Berwickshire, Scotland. TD14 5AP and costs £10.00

And last but not least, Arctan Computer Ventures, 1 Foxwell Square, Southfields, Northampton. NN3 5AT have produced a Dissambler which is very versatile for the more experienced or ambitious ZX81er.

They sent us a review copy and I used it to examine the giant REM we've been building and it worked like a dream, even providing simple editing, convertion and memory options.

```
   1 REM AS PREVIOUSLY SET
  10 LET A$="216842E5CD0442FE0D2
80AD62638F5D61930F1C63FE17723FE0
DC818E7"
 100 FOR I=17000 TO 17028
 110 POKE I,16*CODE A$+CODE A$(2
)-476
 120 LET A$=A$(3 TO )
 130 NEXT I
```

Although written mainly in BASIC it nevertheless does a sterling job with the added benefit of being able to examine the code to see how many of the tasks were tackled.

It cost £5.95 and while you're at it enquire about their bi-monthly ZX81 users magazine, from the description they gave me it sounds like and early issue of ZXC! (even if you aren't buying the program drop them a line and enquire anyway).

NB. Cheques should be made payable TO MG HUGGINS, and that goes for MATRE2, their drawing program, which we mentioned recently.

The Great Project

And so on to our REM project...

Last month a wee gremlin crept into the text for the page and the "Get a Letter" routine text became muddled with the "Get a Number" text, the article should explain that at address 16931 is a routine to wait until an alphabetical character is pressed, and at address 16945 is a routine to wait until a numerical characer is pressed.

Now though these are both very useful for programs which use either a menu or option system of working it is still very limiting when you want a series of characters to be input, as in entering a name or commands for adventure games.

So this month I have provided a routine to accept a string or multiple character entry.

The first thing to do is to set up a buffer to store the sequence of characters, I have used from 17000 to 17049 which allows for 50 characters, if you require more the start the routine further up in the REM when setting the base address. Note that the buffer address is absolute and you will have to modify the code if you want to put it elsewhere.

We also make use of the routines published in the last issue, sorry, but new readers will have to get a copy of the back issue to use this!

Enter the code as printed, RUN is and SAVE your latest version of the REM, next month I'll give a routine to print out the contents of the buffer, experts may like to write their own as a kind of exercise.

Don't forget, I am still looking for YOUR contributions, and as always there is some financial reward for those we use...

See you next month.

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ACROSS THE POND

Mark Fendrick reports on latest Sinclair developments in the States.

With all the talk about the QL over the last few months, one might get the impression that the earlier models had all but faded from the scene here in North America. In fact, that is far from the truth. The situation concerning the T/S 2068 differs from that of the Spectrum line in the United Kingdom in so much as the Timex version hasn't been an actively produced micro for over three years. You could never walk into your neighbourhood computer store and actually expect to buy a T/S 2068 — let alone any software or hardware developed for that micro. The Amstrad takeover was hardly felt in the American T/S 2068 community for that reason. While Amstrad is still selling the remaining stock of Spectrum + and Spectrum 128 computers, an occasional T/S 2068 can still be fond along with the T/S 1000 or T/S 1500 computers.

Yet now, more than three years after Timex's abandonment of the Sinclair faithful, new products are still appearing at a respectable rate. For those of you who haven't purchased your QL yet (so what are you waiting for?), this month we present a look at the developments for the Timex/Sinclair 2068 Colour Computer.

T/S 2000

When the original T/S 2000 was announced, it was identical to the Spectrum which had just made its appearance in England except that the Timex/Sinclair name had replaced that of Sinclair alone. We looked forward to being able to share in the plethora of Spectrum software which was already showing up in Britain. Unfortunately, the Federal Communications Commission would not approve the T/S 2000 as it was and it went back to the drawing board for some revisions. Timex used this excuse to make some changes in the ROM as well as the hardware, and by the time a few more revisions had appeared, the (newly dubbed) T/S 2068 was not only incompatible with Spectrum hardware, but with the software as well. Any programs which we were hoping to use would have to be written specifically for the American model.

But that was all right since Timex was promising to support third party developers of hardware and software for its new computer. But we all know that was not to be. A few of Quicksilva's games were modified to work on the American computer, but that stopped soon as well.

For the last year and more, Knighted Computers have come to the rescue. Located in upstate New York in the small town of Fulton, Ray Payne and Joe Aiello have been obtaining the rights to some of the more popular Spectrum games and have been modifying them to work on the unmodified T/S 2068. With its built in joystick ports and improved sound capabilities, games playing is a natural on the T/S 2068. But the games written for the Spectrum did not take advantage of these features as they are not available on the British micro. Thanks to Knighted Computers, these abilities are now use by these converted programs.

At the moment Knighted Computers is offering more than thirty converted titles. At the Sinclair Computerfest held in May, Knighted Computers announced that they had bought the rights to Durell's line of Spectrum software. The beginning of July saw the first of the Durell software joining with titles from Quicksilva, Virgin, and Digital Integration. Look for still more titles to become part of the Knighted Computer line in their continuing support of the T/S 2068.

Zebra

One of the leading Sinclair support companies since the early days of the ZX-81 is Zebra Systems, Inc. The withdrawal of Timex did not deter Zebra from continually seeking out and developing new products for the T/S 2068 computer. It was Zebra Systems who obtained the rights to the Timex disc drive system, designed for the Portuguese version of Timex's computer. A 3-inch drive is at the centre of this package which comes with either T.O.S. (Timex Operating System) or a CP/M operating system. In addition to offering this storage system, Zebra has also been converting software to run with the new Timex FDD package.

One of the features which everybody had hoped would be easy to utilize on the T/S 2068 was the ability to display 64 columns as opposed to the 32 standard on the ZX-81 line of micros. Unfortunately, although the hardware was designed for either 32 column or 64 column display, in order to use the 64 column mode, a separate screen driver was required. It could be written into your software if you had knowledge

of machine code programming (it could be written in BASIC, but that is extremely slow) and could understand the poorly written and printed Timex Technical Manual (the manual itself has now been fixed and reprinted properly by the Time Designs Magazine Company). However, this is another area addressed by Zebra Systems who have produced the OS64 cartridge containing a 64 column operating system.

The OS64 cartridge fits inside the Command Cartridge port of the T/S 2068 and boots automatically upon power-up when it has been inserted. It utilizes Sinclair BASIC almost identically to the normal operating system, with few minor modifications. It does not, however, support the T/S 2040 or Alphacom 32 printers, but will send hard copy to a full size printer using any of the available interfaces now on the market.

Typical of the Zebra Systems support philosophy, software is being designed to take advantage of the new operating system. The program creating the most interest at the moment is Zebra's new ZTERM terminal software. Previous terminal emulation programs only supported the 32 column mode, although most commercial online database services (such as THE SOURCE and CompuServe) do not support anything less than 40 columns — a number perpetrated by Commodore. Although this did not cause major problems, it was a constant irritation as you had to get used to works being split in half on the screen. ZTERM, in conjunction with OS64 allows 64 column communications making many T/S 2068 telecommunicator happy.

T/S 2068 owners, while being very proud of, and fiercely loyal to, their computers, have often envied the owners of those 'other' computers for certain pieces of software not available to T/S users. One such popular programis PRINTSHOP whose products appear everywhere you turn. About a year ago, Zebra systems came up with "Greeting Car Designer" which was similar to PRINTSHOP, although it could only print greeting cards. Following the natural progression, Zebra has now released "Banner Designer" and "Poster Designer" for the T/S 2068. Using the ability to print from a graphics library and assorted fonts, these two programs, in conjunction with "Greeting Card Designer" give the user the abilities previously available to those other computer owners. Long continuous banners are printed on full size computer paper using "Banner Designer" and posters are printed on 8½ x 11 inch paper using "Poster Designer".

Zebra Systems' catalogue lists many new products (as well as continuing to solicit additional new products) and is certainly worth writing for. Don't forget to mention ZX Computing monthly when you write to any dealer mentioned here.

Aeroc

Yet another long time Sinclair supporter, AERCO, has also come out with a CP/M system for the T/S 2068. CP/M (Control Program for Microcomputers) was once considered the standard operating system of the microcomputer in the days before IBM came onto the personal computer scene. As such, a great deal of software was written for micros running CP/M. Until now, the main stumbling block to having CP/M on the Sinclair computer was the normal 32 column display. CP/M software generally requires an 80 column display along with either an 8 inch or 5¼ inch floppy drive system. This was a natural challenge for AERCO who produced the first floppy disc drive interfaces for the Sinclair computers in the days of the ZX-81.

But it did not come easily. The system was first announced over two years ago, but did not make its appearance until the Computerfest. RP/M is a fully licensed version of CP/M to run n the T/S 2068. It contains a screen driver which delivers a full 80 column display and will run any of the numerous software written for other CP/M systems. Imagine running Wordstar on your T/S 2068. That's exactly what you could have seen at the AERCO demonstration or booth at the Computerfest!

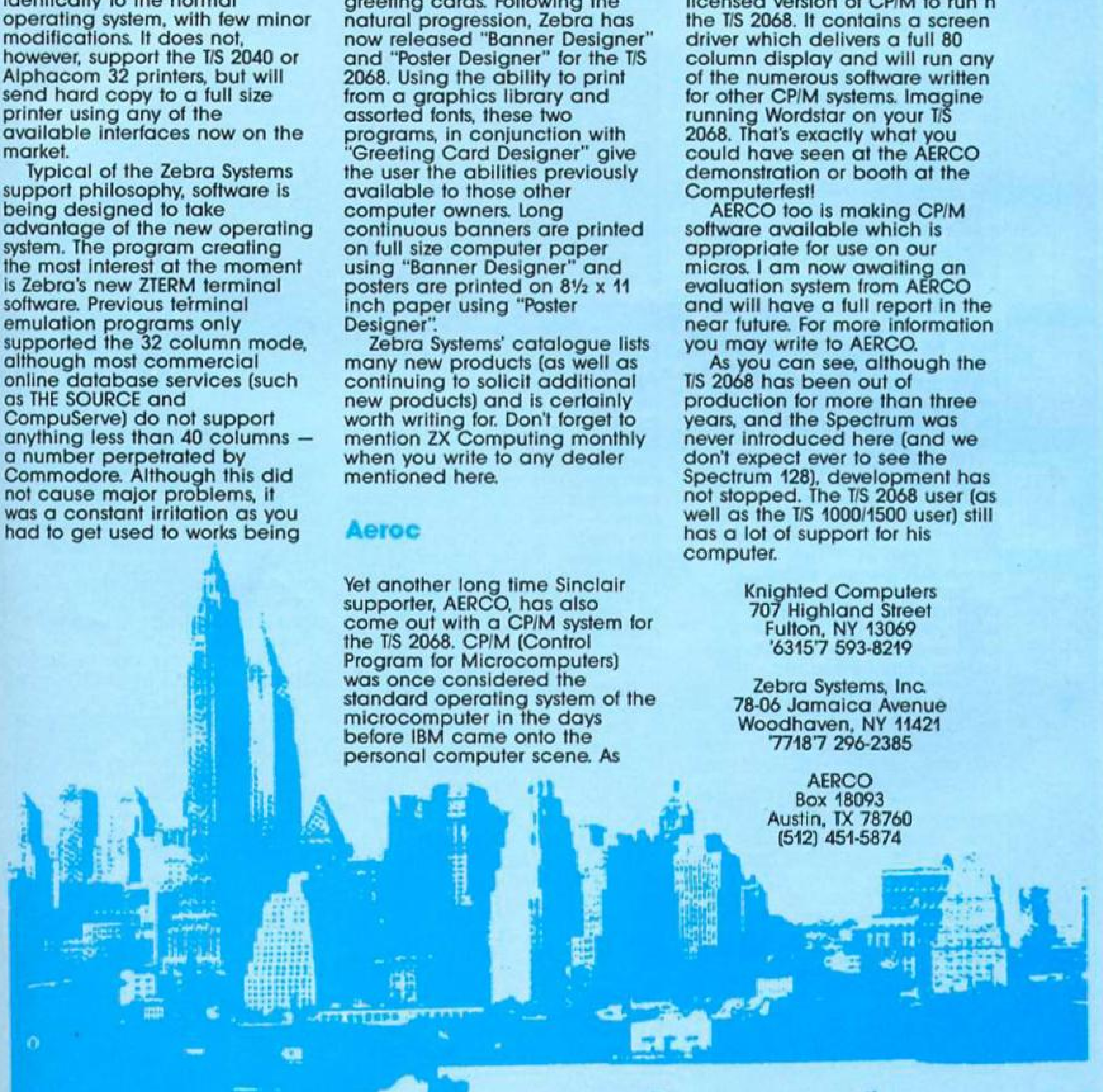
AERCO too is making CP/M software available which is appropriate for use on our micros. I am now awaiting an evaluation system from AERCO and will have a full report in the near future. For more information you may write to AERCO.

As you can see, although the T/S 2068 has been out of production for more than three years, and the Spectrum was never introduced here (and we don't expect ever to see the Spectrum 128), development has not stopped. The T/S 2068 user (as well as the T/S 1000/1500 user) still has a lot of support for his computer.

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Zebra Systems, Inc.
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Austin, TX 78760
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READ ONLY

Eric Doyle emerges from behind the bookpile to review a Basic tutor, a guide to languages and a computing encyclopaedia.

Basically Speaking
Jim Maitland
Computer Publications
£8.95

It comes as a bit of a surprise to find a book published in 1986 on basic Basic programming. Jim Maitland defends this move by insisting that most of the books available on this subject are difficult for the beginner to understand. This, he believes, is the cause of many Spectrums being relegated to the toy box by frustrated novice programmers.

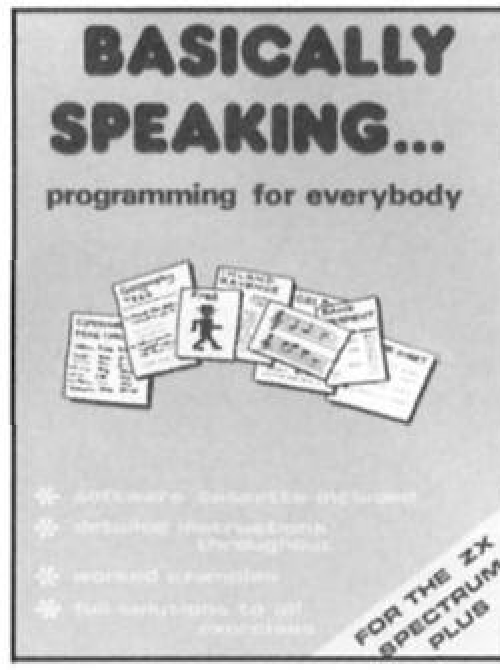
Working on the premise that his book will be a definitive work, he roped in the assistance of his two children, one to draw the graphics and the other to write the programs which are to be found on the accompanying tape.

I'm sure Maitland would agree that his book will not turn anyone into a master programmer but its tight style and measured pace combine to make it well worth the comparatively low price.

Starting with the rudiments of the 'daunting' Spectrum keyboard, the first chapter spends all its time on keyboard familiarisation exercises with a small demonstration of the Spectrums capabilities as the first program on the tape. Each chapter is called a unit so that you can use the book as a day by day tutorial.

Programming begins in the second unit with the PRINT command and simple lne editing. The end of this chapter introduces the first taped exercise which has an incorrectly typed piece of text. The reader is invited to make the necessary changes utilising the new found knowledge gleaned from the preceding text.

Unit 3 is called Simple Sums for Dads and Mums which underlines a second level of interest in the course. Parents can join in the fun with this book's aid and share an interest in the absorbing world of programming. As the title implies, this section deals with the common arithmetical



commands and the syntax necessary to achieve the correct results.

The way in which the rest of the book develops seems so natural that it is obvious that a lot of thought went into the construction of this book. Each chapter's corresponding tape program may never top the software charts but they certainly serve their purpose by adding the necessary hands on experience for the reader.

By the end of the book every major keyword has been discussed in sufficient detail with many little programming hints and tips along the way. If this were all that the book contained it would be sufficient, but there's more.

The appendices to the book carry sample solutions to the exercises which relate to each unit and there are further exercises for the really keen reader. Maitland does explain that the solutions he gives are merely interpretations of the answers and that other approaches are acceptable. After all, the acid test for a program is not whether it is skillfully written, but if it works.

I would highly recommend this book to anyone wishing to learn Basic but lack any knowledge of computers. The book is packed with information but the style is such that it sweeps you along at a comfortable pace. Enquiries can be directed to the author at Computer Publications, 5 Western Drive, Shepperton, Middlesex TW17 8HJ.

Alternative Languages for the Spectrum
Richard Hurley, David Virgo
Duckworth
£6.95

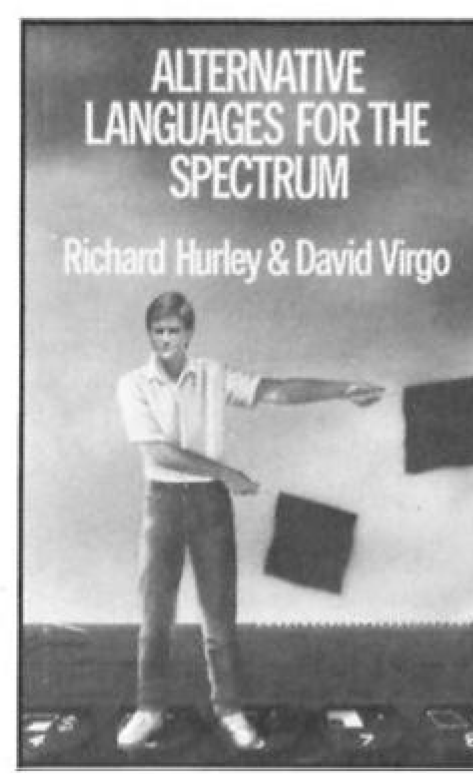
Although the Spectrum is blessed with its own Basic language this does not mean it is the best one for all purposes. Many other languages exist and this book is a description of the range available for the Spectrum user.

The problem with an alternative language is that it occupies space which would normally be free for programming. Obviously this puts memory at a premium, what good is a language if there's no space to write a programme using it?

Out of necessity the various implementations lack the flexibility of full blown operating systems and the authors carefully point out the more obvious omissions.

Each language is given its own chapter and the in-depth approach of the book trnsmits an essence of each system by looking in detail at the applications and commands available through them.

The languages dealt with are C-Language FORTH, LOGO,



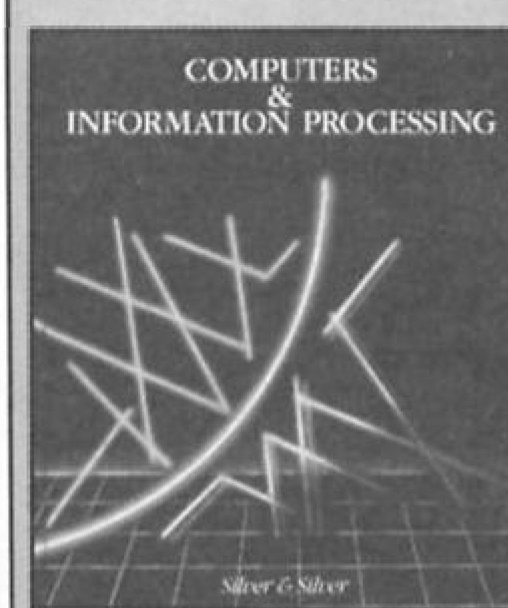
Micro-PROLOG, Pascal, PILOT and some of the specific applications languages Games Designer, The Quill, HURG and White Lightning.

The introduction to each chapter defines the language in terms of its development and the special features of the existing Spectrum implementations. A Basic program is then compared to its equivalent under the new language and this is used as a basis for a suitably detailed look at the architecture and commands available.

The approach of the book is to be machine-dependent but tries not to tie itself too closely to specific software packages. This attitude obviously breaks down when discussing the specific application languages. These are dealt with briefly but informatively in a single chapter at the end of the book. The sections do not go into close syntaxial analyses but do say enough about each to help prospective customers to make their choice.

The book is not merely a buyers' guide but an effective overview of the whole language market. Even if you are not contemplating buying a package it is an enjoyable way to spread your horizons beyond the narrow confines of Basic.

Computers and Information Processing
Gerald and Myrna Silver
Harper & Row Ltd.
£17.95



A hefty tome this one. Not in content but in weight. It is a hardback of almost 600 pages forming a browsable encyclopaedia of computer systems and their applications.

This high quality publication has the distinction of being of American origin but I shan't hold that against it. As a test I sat and thought of a subject, perused the index and, lo and behold, there was a reference.

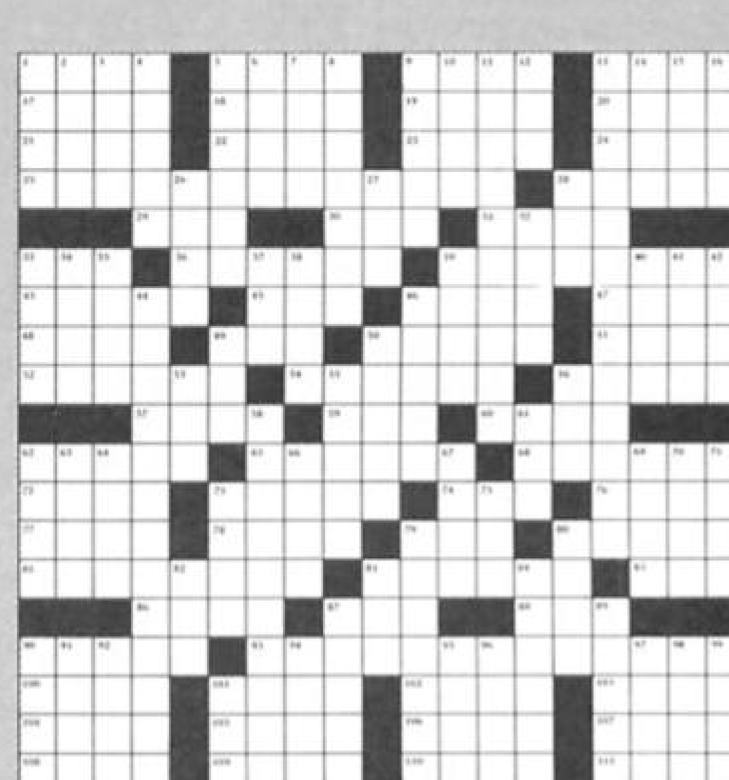
I'm sure there must be something they haven't at least mentioned but I've yet to find it. Peripherals, languages, programming, careers, application software ... everything.

The book naturally has a heavy business applications leaning but this is no disadvantage because what happens in business today percolates through to home computing tomorrow.

The book is written as a course textbook in computing but I've kept this a secret until now because it is nontheless an excellent read. Lacking the dryness of my impression of a textbook, it is still very serious in its approach. Reading it is like digging into a rich, light fruitcake, lots of nutrition but easily digested and just a little goes a long way.

Though the book will age with time, it is bang up to date with the latest laser technology and also contemplates future developments. As you may gather I'm impressed, if not overawed, by this book. It is packed with colourful diagrams and photographs and even an old hack like me can find plenty of interest in its pages. For a serious-minded beginner to computing, this gives an excellent overview of the computer age and should be found in every public and school library. It will certainly take pride of place in mine.

CROSSWORD PUZZLE ON SOFTWARE



ACROSS
1. Toboggan
5. Slipped
9. Unthinking repetition
13. American National Standards Institute: abbr.
17. Conceal
18. ____ Nostra
19. Makes mistakes
20. Schooner's "sheet"
21. "Rub-__ ___-dub, three men . . ."
22. Clue
23. Sausage, e.g.
24. Shiny fabric
25. User guides, manuals, and instructions
28. Invoices
29. Leg: slang
30. Perch
31. Swing dance of the 1930s
33. Ms. MacGraw
36. The center of the operating system
39. Formulators
43. "Filthy ____" (money)
45. Clear after taxes
46. Defeat
47. Kazan
48. Gen. Robert __ ___
49. Motorists' org.
50. Goes on
51. Papas
52. A flashing pointer that moves around a CRT screen
54. Magician's word
56. Baxter and Bancroft
57. Wyatt of the Wild West
59. Office of Naval Intelligence: abbr.
60. Eternal City, to Italians
62. Blatant
65. Consolation
68. Dumbbell
72. Secluded from sight: abbr.
73. Closes up
74. Disencumber
76. Ireland of old
77. Assistant
78. Places
79. "Peter ____"
80. Rockies ski resort
81. Highway foundations
82. Computer language named for French mathematician
85. Superman's insignia
86. Texas city
87. Sailor
88. Gangster's gun: slang
90. Computer language especially for business
93. Type fonts
100. Allege
101. A logic pattern in structured programming
102. Mend argyles
103. On the ocean
104. What "bookworms" do
105. Not working
106. Give off
107. Reminded
108. BASIC statements
109. Doe
110. Reps.' opponents
111. Lather

DOWN
1. ____ roc
2. Beach resort
3. School's purpose: abbr.
4. Detect and fix mistakes in computer program
5. Plot
6. Cut of meat
7. "____ It Romantic?"
8. Collection of information on which a program is to operate
9. Send money
10. Famous brown-and-white cookie
11. Compiler or interpreter program
12. N.Y.'s time zone
13. In BASIC, these identify various storage locations
14. Spike
15. Window part
16. Kinds; types
26. Manufacture
27. Sesame plant
28. Prohibit
32. Bonnets
33. Mr. Guinness
34. Humdinger
35. Cake decorator
37. Relative of DNA
38. Kind of tide
39. Gnat, for one
40. Flair
41. Use a surfboard
42. Backtalk
44. In BASIC, these give directions to the computer
46. Computer language invented by Kemeny and Kurtz
49. Timetable abbr.
50. Ms. Horne and others
53. Acorn producer
55. Baker's products
56. "What Kind of Fool __ __?"
58. A version of computer instructions written in abbreviated form
61. A type of parity check bit
62. Shadowbox
63. Pointer Sisters, for example
64. Opera heroine
66. Foods for fillies
67. Historic periods
69. Remove by rubbing
70. Makes angry
71. Small bills
73. Exceptional: abbr.
75. Letterhead abbr.
79. Marched in a procession
80. Winged
82. Balance: abbr.
83. Golf standard
84. F.B.I. men
87. Candle
89. Pre-Soviet rulers
90. Part of T.L.C.
91. Stove part
92. Necklace element
94. Doughnut feature
95. Arrived
96. Decorate a Christmas tree
97. Jacob's brother
98. Take care of
99. Droops
101. Kettle cover

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MICRONET 800

Free modems? What next? News of Micronet's latest offer plus a round-up of what's new on the network.

One of the biggest factors preventing people from taking the lunge into electronic communications is the need, or rather the cost, of buying a modem. Maybe you can afford the 'phone bills and registration fees, but until recently even the cheapest modem could set you back almost £100.

But now you've got no excuse for not logging on, because Micronet are giving away free modems when you subscribe to a year's membership (at a cost of £66). The modems that they're giving away are the Modem 2000 for the Beeb machine, and, of course, the Prism VTX 5000. The 5000 was specifically designed for use with the Spectrum. It's simple to use and has proved to be highly popular, probably bringing more Spectrum owners into communications than any other modem. All the necessary software is built into the modem and it plugs into the Spectrum's peripheral port just like anyother piece of equipment. Barring miracles you're unlikely to get the necessary equipment and subscription fees for less than the current £66, so if you've been thinking about joining Micronet now's the time (and remember, membership of M'net also allows you access to Prestel's vast information network).

The Spectrum Database

There's more to Micronet than just talking about computers, as the machines are just your pathway into the communications network — once you're there you can normally find someone to chat with on any subject under the sun. However, there are special areas, known as mini-databases, devoted to each of the most popular home micros and, naturally enough, that includes the Spectrum.

The Spectrum database is quite extensive. Not only are there the usual hint and tips, charats, reviews of hardware and software, but the Spectrum also has it's own chatline where you can talk to other owners about all things Spectrumy. In fact the Spectrum database even has its own mini-mini- database, called Spec-Tacular.

Spec-Tacular is edited by its three founders, Michael Kent, Robert Garbutt and Dr. Mike Sun, and includes its own reviews sections as well as an interesting club known as S.U.T.U.G.

This stands for Spectrum User To User Group,, and at the moment the group has over 700 members. Amongst the many programs that you can download from Micronet for your own use is one called the VTX User To User software. This can be downloaded from Micronet for just £3.49 and allows owners of VTX 5000 modems to link their Spectrums directly together over the 'phone without Micronet acting as an intermediary (no charges for sending messages, other than the 'phone bill). With this software you can not only send messages directly to your friend on the other end of the 'phone, you can also transfer BASIC and machine code files between the machines. These are S.U.T.U.G. members all over Britain, and the Spec-Tacular pages include an index of all members listed according to area.

Spec-Tacular recently conducted a poll among its users which revealed them to be a fairly serious bunch, more interested in applications and utilities than in games. So if you're looking for some heavy-duty computer talk you know where to look.

Micronet and P.H.A.B.

Between now and 30th November you have the chance to win £1,000 cash in the competition that Micronet is running in conjunction with PHAB, the organisation whose work is to promote understanding between the Physically Handicapped and Able-Bodied.

The aim of the competition is to write a piece of educational software which will help to increase awareness in able-bodied of the problems that society creates for physically handicapped people.

Any software submitted must run on a standard 48K Spectrum, BBC B, CBM 64 or Amstrad machine,and it should be clearly marked which machine the software is intended for.

The first prize winner will receive £1,000, and Micronet may negotiate with the runners up for the use of their software in its Telesoftware area. Further details about the competition can be obtained from Micronet or from David Wrinch of PHAB on 01-388-1963.

Shades

Hopefully, by the time you read this, Shades, Micronet's new multi-user game, should be up and running. Shades was featured last issue, and is Micronet's answer to MUD. Unlike MUD, Shades has no registration fee and costs 99p per hour when you're playing it, so you should be able to join in the fun without taking out a second mortgage.

For further information on Micronet write to, Micronet, 8 Herbal Hill, London EC1R 5EJ.



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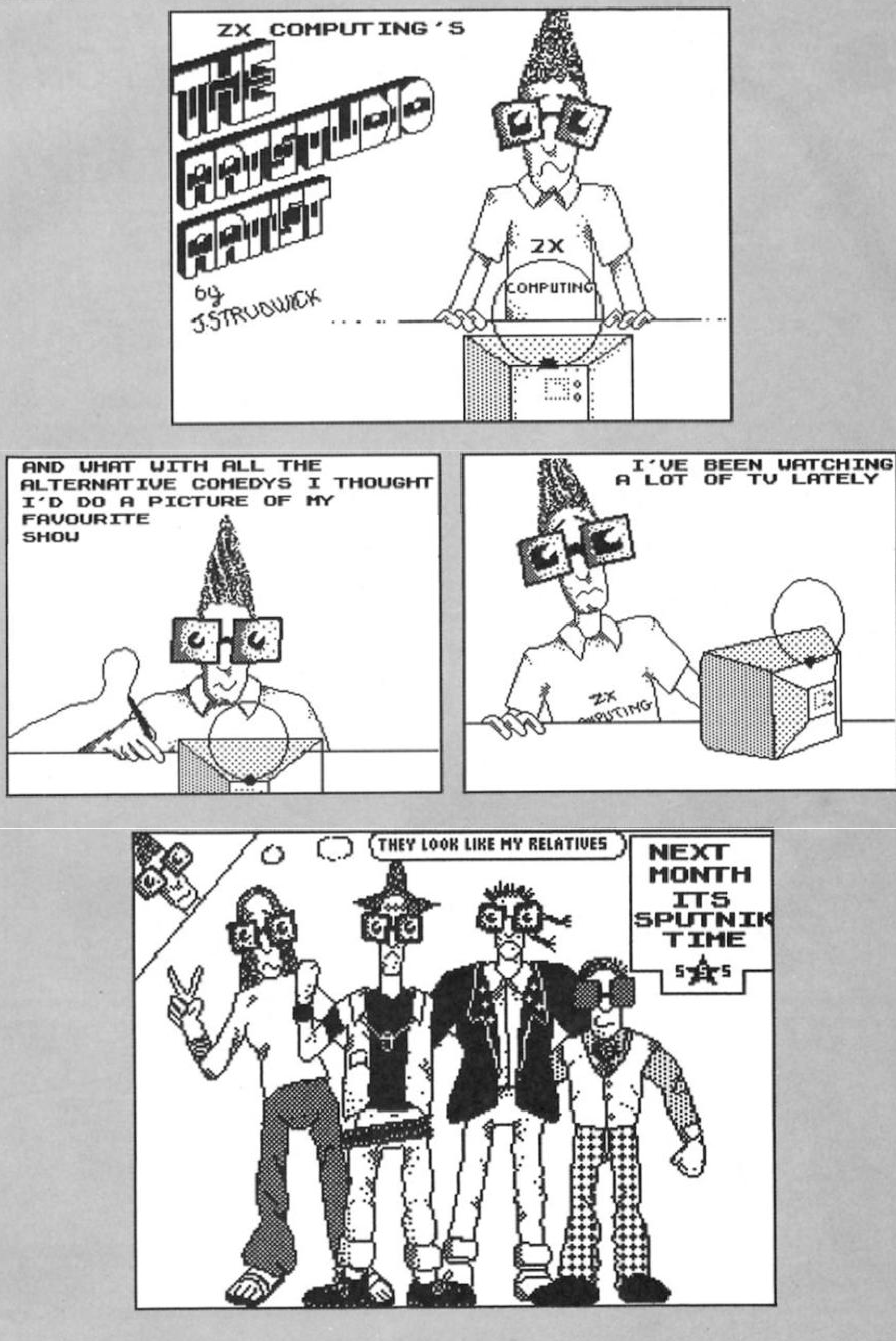
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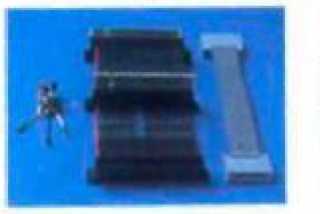
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